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FIRST ANNUAL REPORT
OF THE
Water Commissioner



FOR THE
YEAR ENDING JANUARY 31, 1896.

№ 6355.52


1895-96.



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OF THE
WATER COMMISSIONER,

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1895/96

Printed for the Department.



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OFFICE OF THE WATER COMMISSIONER,
CITY HALL, BOSTON, February 1, 1896.

HON. JOSIAH QUINCY,

Mayor of the City of Boston:

SIR: I submit the annual report of the Water Department for the financial year ending January 31, 1896. As the duties of Water Commissioner were assumed by me February 1, 1896, I am not in a position to make any comments or recommendations.

The receipts and disbursements of the department for the year were as follows:

The total receipts of the Water Works, from all sources, for the year ending January 31, 1896, were as follows, viz.:

Income from sales of water	\$2,211,907 76	
Income from shutting off and letting on water, and fees	7,830 49	
Elevator, fire and service pipes, sale of old materials, etc.	53,231 44	
	<hr/>	\$2,272,969 69

The total expenditures of the Water Works, from revenue, for the year ending January 31, 1896, were as follows, viz.:

Current expenses	\$626,568 37	
Less stock used purchased in previous years,	16,466 67	
	<hr/>	\$610,101 70
Interest on funded debt		863,277 51
Sinking-fund requirement, 1894-95		205,791 00
Refunded water-rates		2,472 85
Extension of mains, etc.		251,984 94
Amount paid Chelsea, Somerville, and Everett, under contracts		163,605 01
Balance to sinking-fund		109,036 68
Redemption of Mystic Water 4% Loan		65,000 00
Transferred to Police Dept. appropriation (on account of officers at Chestnut Hill driveway)		1,700 00
		<hr/>
		\$2,272,969 69

COST OF CONSTRUCTION, AND CONDITION OF THE WATER DEBT.

Cost of construction of Water-Works to February 1, 1895	\$25,400,581 03
Cost of construction of Water-Works to February 1, 1896	26,856,002 82
Increase during the year	<u>\$1,455,421 79</u>
Stock on hand February 1, 1895	\$156,982 22
Stock on hand February 1, 1896	62,268 85
Decrease during the year	<u>\$94,713 37</u>
The outstanding Water Loans February 1, 1895, were .	\$17,761,273 98
The outstanding Water Loans February 1, 1896, were .	18,261,273 98
Increase during the year	<u>\$500,000 00</u>
The Water Sinking-Fund February 1, 1895, was . .	\$8,444,773 55
The Water Sinking-Fund February 1, 1896, was . .	19,099,966 39
Increase during the year	<u>\$655,192 84</u>
Net Water Debt February 1, 1895	\$9,316,500 43
Net Water Debt February 1, 1896	9,161,307 59
Decrease during the year	<u>\$155,192 84</u>

SUMMARY OF COST OF SUDBURY AND COCHITUATE WORKS TO FEBRUARY 1, 1896.

Cochituate supply :

Lake Cochituate	\$291,838 35
Compensating reservoirs	66,859 80
Land and water damages	248,827 34
Engineering expenses to January 1, 1852	40,000 00
Cochituate aqueduct	1,068,425 24
	<u>\$1,715,950 73</u>
<i>Carried forward,</i>	<u>\$1,715,950 73</u>

¹ Consisting of investments (city of Boston bonds) \$8,911,600.00 and cash to the amount of \$188,366.39.

<i>Brought forward,</i>		\$1,715,950 73
Sudbury supply:		
Reservoir No. 1 . . .	\$257,143 81	
“ “ 2 . . .	465,954 11	
“ “ 3 . . .	419,402 72	
“ “ 4 . . .	813,846 38	
“ “ 5, to date . . .	882,770 55	
“ “ 6 . . .	911,752 33	
Whitehall pond . . .	301,293 37	
Cedar swamp . . .	33,590 21	
Work about Farm pond . . .	17,297 94	
Roadway in Framingham . . .	23,947 32	
Land damages, not otherwise specified . . .	342,846 38	
Water damages . . .	559,190 64	
Temporary connection with Lake Cochituate . . .	75,611 73	
Investigations of Shawshine and Charles rivers, etc. . .	27,646 59	
Protection of supplies . . .	298,462 27	
Engineering and engineering expenses . . .	300,371 22	
Office expenses, travelling, etc., . . .	80,594 74	
Miscellaneous . . .	35,282 93	
Conduit and connections at Chestnut-hill reservoir . . .	3,082,661 95	
		8,929,667 19
Distributing reservoirs and distribution:		
Brookline reservoir . . .	\$200,077 21	
Beacon-hill “ (net cost) . . .	363,533 21	
Chestnut-hill “ . . .	2,277,042 93	
South Boston “ . . .	90,908 10	
East “ “ . . .	66,103 09	
Parker-hill “ . . .	205,793 81	
Fisher-hill “ . . .	191,135 35	
Roxbury high service . . .	103,829 53	
Brighton “ “ . . .	7,745 00	
East Boston high service . . .	30,208 12	
West Roxbury high service . . .	22,346 56	
Chestnut-hill pumping-station . . .	523,420 46	
Jamaica-pond aqueduct . . .	88,417 20	
Pipe-yards and buildings . . .	94,832 16	
Engineering expenses . . .	57,873 58	
Distribution . . .	10,083,343 30	
		14,406,609 61
Total cost of Sudbury and Cochituate works,		\$25,052,227 53
Credit by amount received from the State on account of Basin 5 . . .		600,000 00
		<u>\$24,452,227 53</u>

Cost of Mystic works to February 1, 1896 :

Land damages		\$152,836 63
Dam	\$17,167 26	
Grubbing at lake	9,393 26	
Lowering Mystic river	3,012 06	
		<hr/>
		29,572 58
Conduit		129,714 30
Engine-house	\$82,419 33	
Engines	212,637 71	
		<hr/>
		295,057 04
Reservoir		141,856 26
Distribution		874,863 58
Buildings		18,603 05
Engineering, inspection, and salaries		53,216 27
Mystic-valley sewer		83,608 70
Miscellaneous		24,446 88
		<hr/>
Total cost of Mystic works		\$1,803,775 29
		<hr/>
Total cost of combined supplies		\$25,256,002 82
		<hr/>

The outstanding Water Loans on this date, February 1, 1896, are as follows :

Loans.	Date of Maturity.	Amount.
6 per cent. Currency,	Due Dec., 1897 . . .	\$500,000 00
6 " " " "	" June, 1898 . . .	450,000 00
6 " " " "	" Oct., 1898 . . .	540,000 00
6 " " " "	" April, 1899 . . .	250,000 00
6 " " " "	" Jan., 1901 . . .	625,000 00
6 " " " "	" April, 1901 . . .	688,000 00
6 " " " "	" July, 1901 . . .	330,000 00
6 " " " "	" July, 1902 . . .	100,000 00
5 " " Sterling Loan, (£399,500),	" Oct., 1902 . . .	1,947,273 98
6 " " Currency,	" April, 1903 . . .	905,000 00
6 " " " "	" Jan., 1904 . . .	8,000 00
6 " " " "	" April, 1904 . . .	38,000 00
6 " " " "	" Jan., 1905 . . .	161,000 00
6 " " " "	" April, 1905 . . .	142,700 00
6 " " " "	" July, 1905 . . .	44,000 00
6 " " " "	" Oct., 1905 . . .	6,000 00
5 " " Gold Loan,	" Oct., 1905 . . .	1,000,000 00
6 " " Currency,	" Jan., 1906 . . .	82,550 00
6 " " " "	" April, 1906 . . .	8,750 00
5 " " Gold Loan,	" April, 1906 . . .	552,000 00
5 " " " "	" Oct., 1906 . . .	2,000,000 00
6 " " Currency,	" Oct., 1906 . . .	4,000 00
6 " " " "	" Jan., 1907 . . .	8,000 00
6 " " " "	" April, 1907 . . .	5,000 00
6 " " " "	" July, 1907 . . .	1,000 00
5 " " Currency Loan,	" Oct., 1907 . . .	1,000 00
5 " " " "	" April, 1908 . . .	12,000 00
4 " " " "	" April, 1908 . . .	588,000 00
4 " " Loan,	" July, 1909 . . .	82,000 00

Carried forward,

\$14,547,273 98

Loans.				Date of Maturity.	Amount.
<i>Brought forward,</i>					\$14,547,273 98
4½	per	cent.	Loan,	Due Oct., 1909	268,000 00
4	"	"	"	" April, 1910	280,000 00
4	"	"	"	" April, 1912	324,000 00
4	"	"	"	" July, 1913	111,000 00
4	"	"	"	" Oct., 1913	336,000 00
4	"	"	"	" Jan., 1914	466,000 00
4	"	"	"	" April, 1914	18,500 00
4	"	"	"	" Oct., 1914	16,000 00
4	"	"	"	" Jan., 1915	50,000 00
3½	"	"	"	" April, 1915	50,000 00
4	"	"	"	" April, 1915	145,700 00
3½	"	"	"	" Oct., 1915	50,000 00
4	"	"	"	" Oct., 1915	23,000 00
3½	"	"	"	" Jan., 1916	100,000 00
4	"	"	"	" Jan., 1916	58,000 00
4	"	"	"	" April, 1916	128,500 00
3½	"	"	"	" July, 1916	75,000 00
3½	"	"	"	" Oct., 1916	25,000 00
4	"	"	"	" Oct., 1916	286,300 00
4	"	"	"	" Jan., 1917	21,000 00
3	"	"	"	" April, 1917	200,000 00
3½	"	"	"	" April, 1917	275,000 00
4	"	"	"	" April, 1917	161,000 00
4	"	"	"	" July, 1917	7,000 00
4	"	"	"	" Oct., 1917	160,700 00
4	"	"	"	" Jan., 1918	20,000 00
4	"	"	"	" April, 1918	6,300 00
3½	"	"	"	" July, 1918	100,000 00
4	"	"	"	" Oct., 1918	100,000 00
4	"	"	"	" April, 1919	200,000 00
3½	"	"	"	" Oct., 1919	145,000 00
4	"	"	"	" Oct., 1919	300,000 00
3½	"	"	"	" Nov., 1919	130,000 00
3½	"	"	"	" Jan., 1920	220,000 00
4	"	"	"	" Oct., 1920	384,000 00
4	"	"	"	" April, 1921	100,000 00
4	"	"	"	" Oct., 1921	162,500 00
4	"	"	"	" Jan., 1922	100,000 00
4	"	"	"	" April, 1922	75,000 00
4	"	"	"	" Oct., 1922	283,000 00
4	"	"	"	" Oct., 1923	576,275 00
4	"	"	"	" Oct., 1924	644,225 00
Total					\$18,261,273 98

SUMMARY.

3	per	cent.	Loans,	\$200,000 00
3½	"	"	"	1,170,000 00
4	"	"	"	6,214,000 00
4½	"	"	"	268,000 00
5	"	"	Currency Loans,	13,000 00
5	"	"	Gold "	3,552,000 00
5	"	"	Sterling "	1,947,273 98
6	"	"	Loans,	4,897,000 00
Total				\$18,261,273 98

Cochituate Water Debt, Gross and Net,
At the Close of Each Fiscal Year.

Fiscal Year.	Gross Debt.	Sinking-Funds.	Net Debt.
1847-48...	\$2,129,056 32 ¹	.....	\$2,129,056 32
1848-49...	3,787,328 98	.....	3,787,328 98
1849-50...	4,463,205 56	.....	4,463,205 56
1850-51...	4,955,613 51	.....	4,955,613 51
1851-52...	5,209,223 26	.....	5,209,223 26
1852-53...	5,972,976 11	.....	5,972,976 11
1853-54...	5,432,261 11	.....	5,432,261 11
1854-55...	5,403,961 11	.....	5,403,961 11
1855-56...	5,230,961 11	.....	5,230,961 11
1856-57...	5,031,961 11	.....	5,031,961 11
1857-58...	4,724,961 11	.....	4,724,961 11
1858-59...	4,754,461 11	.....	4,754,461 11
1859-60...	3,846,211 11	.....	3,846,211 11
1860-61...	3,455,211 11	.....	3,455,211 11
1861-62...	3,012,711 11	.....	3,012,711 11
1862-63...	2,992,711 11	.....	2,992,711 11
1863-64...	2,992,711 11	.....	2,992,711 11
1864-65...	2,942,711 11	.....	2,942,711 11
1865-66...	3,152,711 11	.....	3,152,711 11
1866-67...	3,370,711 11	.....	3,370,711 11
1867-68...	3,867,711 11	.....	3,867,711 11
1868-69...	5,107,711 11	.....	5,107,711 11
1869-70...	5,731,711 11	.....	5,731,711 11
1870-71...	6,482,711 11	\$1,100,000 00	5,382,711 11
1871-72...	6,812,711 11	1,185,049 67	5,627,661 44
1872-73...	6,912,711 11	1,268,234 97	5,644,476 14
1873-74...	7,863,711 11	1,372,953 62	6,490,757 49
1874-75...	8,123,711 11	1,533,890 28	6,589,820 83
1875-76...	9,735,711 11	1,560,917 83	8,174,793 28
1876-77...	11,548,711 11	1,709,492 60	9,839,218 51
1877-78...	11,545,273 98	2,043,764 73	9,501,509 25
1878-79...	11,753,273 98	2,143,847 85	9,609,426 13
1879-80...	11,697,273 98	1,771,692 92	9,925,581 06
1880-81...	11,631,273 98	1,989,300 88	9,641,973 10
1881-82...	11,631,273 98	2,281,857 89	9,349,416 09
1882-83...	11,955,273 98	2,607,768 46	9,347,505 52
1883-84...	12,882,273 98	2,746,505 58	10,135,768 40
1884-85...	13,045,473 98	3,106,323 82	9,939,150 16
1885-86...	13,491,473 98	3,385,201 26	10,106,272 72
1886-87...	14,142,273 98	3,947,616 92	10,194,657 06
1887-88...	14,741,273 98	4,373,304 09	10,367,969 89
1888-89...	14,941,273 98	4,864,092 54	10,077,181 44
1889-90...	15,696,273 98	5,440,819 47	10,255,454 51
1890-91...	16,267,773 98	5,979,297 80	10,288,476 18
1891-92...	16,423,773 98	6,471,545 34	9,952,228 64
1892-93...	16,758,773 98	7,019,058 38	9,739,715 60
1893-94...	17,055,273 98	7,649,504 87	9,405,769 11
1894-95...	17,761,273 98	8,444,773 55	9,316,500 43
1895-96...	18,261,273 98	9,099,966 39	9,161,307 59

¹ No account taken of amounts borrowed temporarily from 1846 to 1852 and afterwards funded by the issue of the water bonds that figure in this statement.

Cochituate Water Sinking-Fund Receipts.

[SINCE THE ESTABLISHMENT OF THE BOARD OF SINKING-FUND COMMISSIONERS IN 1871.]

YEAR.	From Tax Levy or City Income.	Interest on Investments.	Interest on Bank Deposits.	Water- Rates, etc.	Premiums on Loans.	Other Sources.	Totals.
1871. April 30, received from Committee on Re- duction of Debt.....	\$1,100,000 00	.....	.....	.....	.....	.....	\$1,100,000 00
1871-72.....	14,325 00	.....	.....	.....	.....	.....	85,049 67
1872-73.....	Taxes, 9,375 00	\$61,000 00	\$349 67	.....	.....	.....	80,155 30
1873-74.....	9,000 00	70,137 50	1,017 80	.....	.....	.....	108,962 25
1874-75.....	30,090 00	76,799 60	2,072 65	.....	.....	.....	160,936 66
1875-76.....	75,973 28	82,842 25	2,121 13	.....	.....	.....	155,027 55
1876-77.....	65,554 00	85,470 00	3,617 55	.....	.....	\$386 00	352,574 77
1877-78.....	234,814 00	86,245 66	4,119 47	\$26,480 18	.....	915 46	338,240 08
1878-79.....	Taxes, 214,500 00	85,830 85	10,809 31	27,099 92	.....	.....	493,971 87
1879-80.....	207,456 00	93,264 49	6,181 26	177,195 91	.....	9,874 21	315,278 92
1880-81.....	.....	90,472 42	5,687 62	214,707 24	.....	4,411 64	284,058 26
1881-82.....	.....	86,460 00	167 32	195,668 90	.....	1,762 04	293,648 69
1882-83.....	.....	96,546 35	2,767 90	193,840 86	.....	494 08	331,438 60
1883-84.....	.....	105,129 51	8,486 33	216,581 72	.....	1,241 04	141,362 12
1884-85.....	973 00	138,120 90	2,268 22	209,258 39	.....	.....	359,818 24
1885-86.....	.....	143,049 45	7,510 40	120,129 12	.....	.....	283,069 71
1886-87.....	.....	156,694 01	5,804 31	297,928 95	.....	442 27	562,415 66
1887-88.....	Taxes, 75,496 00	181,264 89	2,644 70	221,620 11	.....	5,081 12	425,682 17
1888-89.....	.....	199,883 90	4,178 16	256,013 57	.....	.....	489,572 98
1889-90.....	.....	213,048 22	8,958 69	300,903 00	\$11,552 50	.....	576,726 93
1890-91.....	.....	228,000 83	11,730 60	242,675 22	36,092 50	.....	538,478 33
1891-92.....	.....	229,509 17	29,763 94	275,014 05	36,530 00	.....	552,247 54
1892-93.....	.....	175,808 33	22,560 16	240,435 00	.....	78,865 00	547,503 04
1893-94.....	.....	260,506 20	30,148 34	299,467 27	16,418 50	.....	630,446 49
1894-95.....	.....	298,224 44	18,133 03	297,518 29	14,621 75	.....	638,268 68
1895-96.....	.....	312,332 05	18,524 22	205,791 00	.....	9,894 12	655,192 84
.....	.....	378,819 55	5,892 29	.....	64,690 00	.....	.....
.....	\$2,037,556 28	\$3,935,460 57	\$215,515 07	\$4,018,328 20	\$179,900 25	\$113,366 98	\$10,500,127 35

DETAILED EXPENDITURES UNDER THE SEVERAL APPROPRIATIONS.

FEBRUARY DRAFT, 1895, to FEBRUARY DRAFT, 1896.

Extension of Mains, etc. (from Revenue).

Labor	\$121,841 79	
Teaming	6,295 05	
Blasting	7,607 03	
Water-pipes, contracts (including inspection, \$1,756.65)	58,082 76	
Stock	52,251 18	
Miscellaneous	5,907 13	
		<hr/>
		<u>\$251,984 94</u>

¹*Additional Supply of Water.*

(Account of Basin 5, Whitehall pond, Cedar swamp, and Protection of Supply.)

Salaries and labor	\$13,498 87
Engineering and supplies	30,246 84
Materials	3,833 42
Teaming	2,158 59
Freight and express	145 09
Travelling expenses	701 38
Advertising, printing, and stationery	927 83
Rents	425 55
Land damages	317,831 06
Miscellaneous	4,619 53
Town of Southborough, for police service	6,133 25
Town of Framingham, towards sewerage system	² 1,000 00
Marlborough filter beds	10,706 75
Miscellaneous contracts	827 00
Contract, Dam 5 (on account)	153,127 68
Contract, Section A, Basin 5 (on account)	15,852 34
Contract, Section B, Basin 5 (on account)	21,209 42
Contract, Section C, Basin 5 (on account)	18,616 71
Contract, Section D, Basin 5 (on account)	36,540 91
	<hr/>
<i>Carried forward,</i>	\$638,402 22

¹ Of expenditures under this appropriation the amount of \$541,122.28 was from loans issued by the City, and \$566,905.72 from sums received from the State on account of the taking of Basin 5 by the Metropolitan Water Board.

² Additional sum of \$30,000 also paid from appropriation "Protection of Water Supply."

<i>Brought forward,</i>	\$638,402 22	
Contract, Section E, Basin 5 (on account)	20,747 44	
Contract, Section F, Basin 5 (on account)	24,999 96	
Contract, Section G, Basin 5 (on account)	13,116 06	
Contract, Section H, Basin 5 (on account)	11,425 26	
Contract, fence for roads, Basin 5 (on account)	1,561 65	
Contract, two portions Framingham-Marlborough road	13,220 56	
	<hr/>	\$723,473 15
(Account of High Service.)		
Labor	\$87,888 58	
Engineering	1,342 00	
Materials	34,172 22	
Teaming	6,361 02	
Blasting	2,560 13	
Freight and express	348 46	
Travelling expenses	1,534 35	
Advertising, printing, and stationery,	333 69	
Miscellaneous	706 64	
Miscellaneous contracts	4,088 00	
Contract, pipes and specials (including inspection, \$1,012.50)	167,985 09	
Contract, additional pumping-engine No. 3, balance (total, \$122,499.30),	18,067 58	
Contract, laying 42-inch main in Newbury street	2,987 82	
Contract, laying 6-inch main between Long and Gallop's Islands	12,081 96	
Contract, laying sewer in Walnut street, Brookline	2,152 84	
Contract, laying 48-inch main in Brookline (on account)	14,909 91	
Contract, laying 42-inch main in Huntington avenue (on account)	18,645 06	
Contract, laying 4-inch pipe between Long and Rainsford Islands (on account)	8,389 50	
	<hr/>	384,554 85
		<hr/>
		<u>\$1,108,028 00</u>

Protection of Water Supply (Special Loan).

Amount paid to town of Framingham, towards system of sewerage filtration ¹\$30,000 00

¹Payment of \$1,000 also made from appropriation "Additional Supply of Water," making total of \$31,000 paid to town under agreement.

<i>Brought forward,</i>	\$351,277 00
Temporary high-service, Elm Hill	3,024 16
Albany-street yard	4,626 17
Chestnut-Hill Reservoir (care of grounds, etc.) . .	13,143 58
Parker-Hill Reservoir	1,198 23
Brookline Reservoir	2,556 35
East Boston and South Boston Reservoirs . .	465 63
Fisher-Hill Reservoir	3,826 97
Lake Cochituate	3,745 62
Chestnut-Hill driveway (including stable) . .	10,757 63
Taxes	9,224 84
Damages	767 90
Analyses of water, etc.	410 00
Filtration	141 67
Biological Laboratory	1,802 44
Natick filters	3,321 09
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	\$410,289 28

MAINTENANCE ACCOUNTS, MYSTIC SYSTEM.

(FROM REVENUE.)

FEBRUARY DRAFT, 1895, TO FEBRUARY DRAFT, 1896.

Salaries, printing, stationery, advertising, postage, travelling expenses, and miscellaneous, on account of office	\$6,292 66
Salaries and labor, printing and stationery, travel- ling expenses, and miscellaneous, on account of Income Division ¹	7,716 53
Salaries, printing, stationery, travelling expenses, and miscellaneous, on account of Mystic Division, Engineer's Department	5,753 87
Meters, repairing	6,353 72
Off and on water (labor)	3,199 40
Main-pipe laying (including stock and labor) . .	1,846 07
Main-pipe relaying (including stock and labor) .	2,605 03
“ repairing “ “ “ “	4,216 02
Service-pipe laying “ “ “ “	1,171 96
“ repairing “ “ “ “	1,023 07
Hydrants “ “ “ “	1,747 32
Gates “ “ “ “	1,957 95
Streets “ “ “ “	942 64
Lake	318 31
Conduit	8,219 44
New meters, and setting	1,494 18
Stables	1,178 05
	<hr/>
<i>Carried forward,</i>	\$5,337 23
	<hr/>
	\$61,373 45

¹ From July 1, 1895.

<i>Brought forward,</i>	\$61,373 45
Reservoir	4,609 13
Pumping-service (salaries, wages, fuel, repairs, etc.),	32,695 96
Repair-shop	2,634 68
Fountains	683 63
Tools and repairing	954 53
Mystic Sewer (repairs, and pumping and treatment of sewage)	9,529 05
Waste-detection Service	2,930 49
Protection of water sources (including salaries of three Special Agents on Pollution)	5,802 41
Analyses of water	125 00
Damages	5 60
Taxes	115 58
New pumping-engine No. 4 (on account)	54,138 16
Addition to pumping-station (on account)	9,578 91
	<hr/>
	\$185,176 58
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Contracts Made and Pending during Year commencing February 1, 1895, and ending January 31, 1896.
Contracts marked thus () are completed. Amounts marked thus (†) are for extra work.*

DATE.	CONTRACTORS.	WORK.	AMOUNT.	PAID ON CONTRACT.		
				Previous Years.	Year 1895.	Total.
1892. *June 8, Mod'rd Aug. 1,	N. F. Palmer, Jr., & Co.,	High-service Pumping-engine, No. 3	\$124,000 Less on account 2,500 modification. \$121,500	\$104,431 72	\$17,068 28	\$122,499 30
Sept. 29, 1893. July 27,	{ Lamprey Boiler Furnace } { Mouth Protector Co., } Moulton & O'Mahoney . .	{ Attachment to boilers at pumping-stations { 6 months' trial free of expense to city 1 Building Dam No. 5, Southboro'	{ \$90 per boiler, if iron } if { \$105 " " } if brass } accepted. { \$454,729.90 paved { \$446,823.90 ripped	88,439 39	151,579 23 †1,548 45	241,567 07
Dec. 30, 1894. *Mar. 7,	{ George F. Blake Manu- } { facturing Co. } Osgood & Hart	Mystic Pumping-engine, No. 4 Iron and service box-castings	{ \$38,950. N.B. \$500 retained } { by the city when final esti- } { mate was made } 1 65-100 cents per lb.	27,265 00	11,185 00 †118 81	38,563 81
* " 7,	Granular Metal Co.	{ Brass castings, composition, No. 1 " " 2 " " 3	{ 14½ cents per lb. 12½ " " 11½ " "	2,385 68	1,595 55	3,981 23
* " 7,	Charles E. Howe	Teaming water-pipes, etc., for one year	{ 64 cents per ton, 2½ miles " " over 2½ miles \$1.08	3,693 00	116 10	3,809 10
*July 13,	Thomas & Co.	800 tons coal for Chestnut Hill Pumping-station . .	{ \$4.27 per ton 2,240 lbs. 25 cents per ton	2,547 13	1,680 15	4,227 28
* " 21,	" "	{ Trimming coal in bins, Chestnut Hill Pumping- } { station, under their contract of July 13, 1894. . }		149 13	98 37	247 50

¹ Taken by the State January 4, 1896.

Contracts Made and Pending during the Year. — *Continued.*

DATE.	CONTRACTORS.	WORK.	AMOUNT.	PAID ON CONTRACT.		
				Previous Years.	Year 1895.	Total.
1894.						
Aug. 27,	Auguste Saucier	1 Section A, Basin No. 5	\$2,018.50 (estimated)	\$3,254 98	\$15,852 34	\$29,107 32
Oct. 30,	Mack & Moore	Addition to Mystic Pumping-station	\$10,900 (estimated)	13,000 00	7,917 91	10,917 91
*Nov. 23,	{ George F. Blake Manu- facturing Co. }	{ Changes in hand-rail stanchions at Mystic Pump- ing-station to adapt them for electric lighting . }	\$125 . . . . .	. . . . .	125 00	125 00
*Dec. 24,	Martin F. Kelley	Blasting, Robeson street, West Roxbury	\$5.95 per cubic yard . . . . .	. . . . .	25 59	25 59
* " 26,	" "	" Townsend " Roxbury (for hydrant)	\$9.00 " " . . . . .	. . . . .	41 40	41 40
1895.						
*Jan. 28,	David Sturtevant & Co.	{ 800 tons George's Creek Cumberland coal, Barton mine, in bins at the Chestnut Hill Pumping- station }	\$4.27 per ton 2,240 lbs. . . . .	. . . . .	4,038 97	4,038 97
*Feb. 8,	F. H. Odiorne & Co.	{ 2,000 tons Rockhill bituminous coal for Mystic Pumping-station, in bins }	\$3.63 " " " . . . . .	. . . . .	7,227 72	7,227 72
* " 13,	Coffin Valve Co.	Two sluice-gates for Mystic Pumping-station	\$285 each . . . . .	. . . . .	570 00	570 00
* " 14,	Curtis & Pope	25,000 feet kyanized spruce	\$23.50 per M. . . . .	. . . . .	606 30	606 30
* " 14,	J. O. Wetherbee	25,000 feet kyanized spruce	\$23.50 per M. . . . .	. . . . .	580 52	580 52
* " 15,	Dennis Lyons	Blasting Dewey street, Dorchester	\$2.24 per cubic yard . . . . .	. . . . .	16 35	16 35
* " 20,	Chadwick Lead Works	3,400 feet 2-in. lead pipe	4 1-5 cents per lb. . . . .	. . . . .	2,325 96	2,325 96
* " 20,	S. C. Nightingale & Childs,	{ Covering with magnesite the steam-pipe from boiler to economizer-engine, and feed-water pipe from economizer to boiler, Chestnut Hill Pumping-station }	\$18.00 . . . . .	. . . . .	18 00	18 00

Contracts Made and Pending during the Year. — Continued.

DATE.	CONTRACTORS.	WORK.	AMOUNT.	PAID ON CONTRACT.		
				Previous Years.	Year 1895.	Total.
1895. Mar. 16,	Warren Foundry and Machine Company	{ Furnishing two lengths 30-inch flange pipe for } Mystic force main	0½ cents per lb. f.o.b., Boston . . . . .	.....	\$110 77	\$110 77
* " 20,	Josiah H. Long	{ Stop-cocks to be delivered at Albany-street yard, } viz.: 7—20 inch 4—30 " 8—36 "	{ \$145.00 each \$237.00 " \$400.00 "	.....	5,363 00	5,363 00
* " 28,	Martin F. Kelley	Blasting, Devon street, Roxbury	\$3.21 per cubic yard . . . . .	.....	19 26	19 26
* April 3,	Thomas Burke	" Spruce street, West Roxbury	\$4.73 " " . . . . .	.....	270 08	270 08
* " 3,	" "	" Calumet street, Roxbury	\$7.00 " " . . . . .	.....	14 00	14 00
* " 3,	" "	" Humboldt avenue, Roxbury	\$3.40 " " . . . . .	.....	30 94	30 94
* " 3,	Henry Parsons	{ Setting stone posts for pipe fence along roads at } Basin No. 5, Southborough	\$147.00 . . . . .	.....	147 00	147 00
" 4,	John Berry	{ Building filter-beds near Marlborough junction . . } "	\$3,950.00 (estimated) . . . . .	.....	{ 8,385 76 +2,620 99	11,006 75
* " 4,	Wheeler Condenser and Engineering Company	{ Furnishing and erecting Edmiston patent feed } water filter at Chestnut Hill pumping-station . . }	\$370.00 . . . . .	.....	370 00	370 00
* " 12,	Martin F. Kelley	Blasting, Savin street, Roxbury	\$3.98 per cubic yard . . . . .	.....	12 74	12 74
* " 13,	Thomas Burke	Blasting, Calumet street, Roxbury	\$4.20 " " . . . . .	.....	18 06	18 06
* " 22,	A. Mitchell & J. Conedella	{ Building two portions Framingham-Marlborough } road, Southborough	\$10,607.00 (estimated) . . . . .	.....	{ 12,830 88 + 389 68	13,220 56
* " 26,	Thomas Burke	Blasting, Chamber street, Dorchester	\$5.80 per cubic yard . . . . .	.....	19 14	19 14
* " 26,	" "	" Oswald street, Roxbury	\$3.97 " " . . . . .	.....	222 32	222 32

1895. * July 17,	{ McNeal Pipe and Foundry Company }	{ Special castings, 36-in., 42-in., and 48-in. branches and curves }	\$0.02 37-100 cents per lb. . . . .	. . . . .	\$2,031 84	\$2,031 84
" 17,	{ Henry Parsons }	{ 20,000 linear feet of fence for roads at Basin No. 5, Southborough }	\$0.79 $\frac{3}{4}$ cents per linear foot . . . . .	. . . . .	1,561 65	1,561 65
* " 22,	Martin F. Kelley	Blasting, Galena street, Roxbury	\$4.75 per cubic yard . . . . .	. . . . .	12 35	12 35
* " 26,	Dennis Lyons	" Corey road, Brighton	\$2.40 " " . . . . .	. . . . .	240 48	240 48
* " 26,	S.C. Nightingale & Childs,	{ Covering Boiler-tops at Mystic Pumping-station with asbestos }	\$105.88. . . . .	. . . . .	105 88	105 88
* " 29,	Dennis Lyons	Blasting, Seaver street, Roxbury	\$2.23 per cubic yard . . . . .	. . . . .	235 27	235 27
* " 30,	Martin F. Kelley	" Calumet "	\$5.50 " " . . . . .	. . . . .	18 70	18 70
* " 30,	" "	" Glenway street, Dorchester	\$3.45 " " . . . . .	. . . . .	97 64	97 64
* Aug. 5,	" "	" Washington street, West Roxbury	\$4.47 " " . . . . .	. . . . .	1 207 31	207 31
* " 6,	James McDonald	" Heath street, Roxbury	\$3.75 " " . . . . .	. . . . .	196 87	196 87
* " 7,	Martin F. Kelley	Blasting, Quincy street, Dorchester	\$2.99 " cubic yard . . . . .	. . . . .	14 65	14 65
* " 8,	Dennis F. O'Connell	Laying 42-in. Main in Newbury street	\$2.47 " linear foot . . . . .	. . . . .	2,987 82	2,987 82
* " 9,	Martin F. Kelley	Blasting, Howard street	\$3.00 " " . . . . .	. . . . .	11 40	11 40
* " 12,	" "	" Washington street, West Roxbury	1 \$4.47 " " . . . . .	. . . . .	154 75	154 75
* " 15,	" "	" Rockdale and Oakland streets, Dorchester,	\$3.84 " " . . . . .	. . . . .	253 50	253 50
" 16,	Wilkinson & Feldman	Electric-wiring at Mystic Pumping-station	\$475 . . . . .	. . . . .	12 58	12 58
* " 17,	Thomas Burke	Blasting, Savin street, Roxbury	\$3.93 per cubic yard . . . . .	. . . . .	3,452 90	3,452 90
* " 19,	L. G. Burham & Co.	1,200 tons coal for Mystic Pumping-station	\$3.34 " ton (2,240 lbs.) . . . . .	. . . . .	15 41	15 41
* " 19,	Thomas Burke	Blasting, Calumet street, Roxbury	\$3.95 " cubic yard . . . . .	. . . . .	
" 21,	{ Harrison Safety Boiler Works }	Feed Water Hoater, Mystic Pumping-station	\$398. . . . .	. . . . .	

¹ Taken by the State January 4, 1896.

Contracts Made and Pending during the Year. — *Continued.*

DATE.	CONTRACTORS.	WORK.	AMOUNT.	PAID ON CONTRACT.		
				Previous Years.	Year 1895.	Total.
1895. * Aug. 23,	Martin F. Kelley	Blasting, Ruthven street, Roxbury	\$2.37 per cubic yard { Sewer, \$1.25 per linear foot; House connections, \$3 each; Manholes, \$20 each; Connect- ing Irving street, \$10; Walnut place, \$2 per linear foot; Rock excavations, above grade, \$3.49 per cubic yard; Rock excavations, below grade, \$6 per cubic yard; earth ex- cavation, below grade, \$1 per cubic yard . . . . . }	. . . . .	\$46 45	\$46 45
* " 26,	Dennis F. O'Connell . . .	{ Laying 15-in. pipe sewer, Walnut street, Brook- line, between High street and Walnut place, with manholes and connections. Materials, ex- cept sand, furnished by City . . . . . }		. . . . .	2,152 84	2,152 84
" 28,	Horatio Wellington & Co.	{ Coal for East Boston and West Roxbury Pumping- stations to January 1, 1896 }	{ \$3.99 per ton (2,000 lbs.), East Boston; \$4.34 per ton (2,000 lbs.), West Roxbury . . . . . }	. . . . .	646 45	646 45
* Sept. 3,	Martin F. Kelley	Blasting, Galena street, Roxbury	\$3.15 per cubic yard . . . . .	. . . . .	9 45	9 45
* " 5,	J. B. O'Rourke & Co. . .	{ Laying 42-in. pipe in Huntington avenue, between Boylston and Gainsboro streets }	\$2.08 " linear foot . . . . .	. . . . .	{ 8,339 24 132 05 }	{ 8,431 29 }
* " 10,	E. J. Bowes	{ Blasting, Humboldt avenue and Townsend street, Roxbury }	\$3.80 " cubic yard . . . . .	. . . . .	25 46	25 46
* " 10,	{ H. W. Johns Manufac- turing Company }	{ Covering pipes and steam surfaces at Mystic Pumping-station }	\$155 . . . . .	. . . . .	185 00	185 00
* " 11,	Atlantic Works	{ Furnishing and attaching Scum Blow-off at Chest- nut Hill Pumping-station }	\$43.00 . . . . .	. . . . .	43 00	43 00

1895.	Thomas Burke	Blasting, Norton street, Dorchester	\$3.00 per cubic yard	\$74 70	\$74 70
* Sept. 14,	E. J. Bowes	" Humboldt avenue, Roxbury	\$3.25 " "	10 73	10 73
* " 14,	" "	" Day street, Roxbury	\$5.00 " "	9 00	9 00
* " 14,	Atlantic Works	{ Two calorimeter pipes for boiler, and low-pressure piston for Engine No. 3 at Chestnut Hill Pump- ing-station }	\$48.00 (Calorimeter pipes.) { (Piston by day labor.) }	48 00	48 00
* Sept. 25,	Thomas Burke	Blasting, Rockledge street, Roxbury	\$3.74 per cubic yard	132 02	132 02
* " 25,	Martin F. Kelley	" Fowler street, Dorchester	\$2.34 " "	480 17	480 17
* " 27,	Thomas Burke	" Delaware street, Roxbury	\$3.48 " "	44 20	44 20
* " 27,	E. J. Bowes	" Rockland street, Roxbury	\$5.00 " "	9 50	9 50
* " 30,	" "	" Virginia street, Dorchester	\$10.00 " "	5 00	5 00
* " 30,	" "	" Galena street, Roxbury	\$8.00 " "	8 00	8 00
* Oct. 2,	Thomas Burke	" Huntington avenue, Roxbury	\$2.18 " "	386 51	386 51
* " 3,	E. J. Bowes	" Dorr street, Roxbury	\$10.00 " "	9 00	9 00
* " 4,	Martin F. Kelley	" Lambert street, Roxbury	\$4.95 " "	42 57	42 57
* " 7,	{ E. J. Bowes (two con- tracts) }	" Galena street, Roxbury	\$4.40 " "	33 00	33 00
* " 8,	R. D. Wood & Co.	Furnishing 50 lengths 8-inch flexible-joint pipes	\$31.40 per ton, 2,240 lbs.	529 27	529 27
* " 11,	Thomas Burke	Blasting, Rockland street, Roxbury	\$4.40 per cubic yard	10 56	10 56
* " 16,	" "	" Logan street, Roxbury	\$4.00 " "	29 60	29 60
* " 16,	" "	" Rockledge street, Roxbury	\$5.80 " "	7 54	7 54
* " 16,	S. C. Nightingale & Childs,	{ Furnishing and applying magna-bestos covering to piping at Chestnut Hill Pumping-station }	\$124.82	124 82	124 82
* " 19,	E. J. Bowes	Blasting, South Fairview street, West Roxbury	\$6.00 per cubic yard	60 60	60 60

1 This amount paid includes settlement for work done under extension of contract, August 12.

Contracts Made and Pending during the Year. — *Continued.*

DATE.	CONTRACTORS.	WORK.	AMOUNT.	PAID ON CONTRACTS.		
				Previous Years.	Year 1895.	Total.
1895.						
* Oct. 21,	James McDonald	Blasting, Rockway and Chester streets, Dorchester .	\$2.50 per cubic yard . . . . .	.....	\$327 50	\$327 50
" 21,	L. G. Burnham & Co. . .	{ 400 tons coal for Mystic Pumping-station, addi- tional to contract of August 19, 1895 (in bins, } 200 tons, more or less)	{ \$3.34 per ton. \$3.59 " " }	.....	
" 21,	" "	{ 500 tons Georges Creek Cumberland coal for } Chestnut Hill Pumping-station (in bins) }	{ \$3.90 " " " " " " " " }	.....	1,660 61	1,660 61
" 21,	J. B. O'Rourke & Co. . .	{ Laying 42-in. pipe in Huntington avenue, from } point east of Francis street, towards city . . . }	{ \$1.90 per linear foot.	.....	
* " 21,	{ McNeal Pipe & Foundry } Co.	{ 200 tons 12-in. pipe, Class B } 50 " 10-in. " " " " " " " " }	{ \$23.60 per ton, 2,240 lbs., by rail .	.....	3,717 29	3,717 29
" 24,	Wilkinson & Feldman . .	{ Alterations in electric fixtures at Mystic Pumping- } station	{ \$16.00.	.....	
* " 25,	Martin F. Kelley	Blasting, Calumet street, Roxbury	\$3.98 per cubic yard . . . . .	.....	9 95	9 95
* " 25,	" "	" Harvard street, Dorchester	\$3.45 " " " " " " " " "	.....	43 82	43 82
* " 25,	" "	" Kenilworth street, Roxbury	\$7.00 " " " " " " " " "	.....	12 60	12 60
* " 25,	" "	" Standard street, Dorchester	\$3.24 " " " " " " " " "	.....	100 76	100 76
* " 26,	" "	" Cherokee street, Roxbury	\$2.98 " " " " " " " " "	.....	41 42	41 42
* " 29,	" "	" Mapleton street, Brighton	\$4.98 " " " " " " " " "	.....	51 72	51 72
* Nov. 6,	Thomas Burke	" Logan street, Roxbury	\$4.87 " " " " " " " " "	.....	18 02	18 02

1895.

1895.		{ Stop-cocks : 4 — 20-in. }	\$165 each.			
Nov.	6,	Josiah H. Long	\$195	"	6 — 24-in.	\$195
		"	\$309	"	7 — 30-in.	\$309
		"	\$485	"	6 — 36-in.	\$485
"	8,	E. J. Bowes	\$2 per cubic yard	"	Blasting, Geneva avenue, Dorchester	\$408 80
"	8,	J. B. O'Rourke & Co.	\$1.90 per linear foot	"	Laying balance of 42-in. pipe in Huntington avenue	4,555 29 +145 38
"	9,	Thomas Burke	\$3.87 per cubic yard	"	Blasting, Moreland street, Roxbury	14 32
"	12,	"	\$3.40	"	" Dalmatia street, Roxbury	13 94
"	13,	James McDonald	\$1.71	"	" Columbia street, Dorchester	156 64
"	13,	Thomas Burke	\$6.00	"	" Munroe street, Roxbury	18 60
"	13,	Martin F. Kelley	\$6.75	"	" Rosewood street, Dorchester	232 20
"	13,	{ George F. Blake Manu- facturing Co. }	\$540.	"	{ Furnishing engine-room floor-grating and materials for Mystic Pumping-station }	28 00
"	14,	E. J. Bowes	\$10.00 per cubic yard	"	Blasting, Blue Hill avenue, Roxbury	6 30
"	14,	"	\$3.00	"	" Johnson park, "	6 65
"	14,	"	\$3.50	"	" Warren street, "	51 28
"	14,	"	\$1.98	"	" Stanwood street, "	3,600 25
"	14,	R. D. Wood & Co.	\$23.80 per ton	"	150 tons 30-in. pipe, Clas B	252 96
"	18,	Thomas Burke	\$3.47 per cubic yard	"	Blasting, Oakland street, Dorchester	86 04
"	19,	"	\$2.74	"	" Norton "	35 10
"	20,	Martin F. Kelley	\$9.00	"	" Station " Roxbury	
"	20,	H. P. Nawn	\$15.00 for each.	"	{ Changing house-sewer connections on Huntington avenue, between Gainsboro' street and Rogers avenue }	

Contracts Made and Pending during the Year. — *Concluded.*

DATE.	CONTRACTORS.	WORK.	AMOUNT.	PAID ON CONTRACTS.		
				Previous Years.	Year 1895.	Total
1895.						
* Nov. 22,	J. B. O'Rourke & Co. . .	{ Laying 42-in. pipe in Huntington avenue, between Farker and Gainsboro' streets. }	\$1.90 per linear foot . . . . . }	. . . . .	\$3,250 20	\$3,523 10
* " 25,	Martin F. Kelley	Blasting, Savin street, Roxbury	\$5.00 per cubic yard . . . . .	. . . . .	1262 90	
* " 27,	Thomas Burke	" Lyon street, Dorchester	\$7.00 " " " " " " " " " " " "	. . . . .	29 00	29 00
Dec. 4,	" " " " " " " " " " " "	" Commonwealth avenue, Brighton	\$6.50 " " " " " " " " " " " "	. . . . .	69 30	69 30
" 7,	McNeal Pipe and Foundry Co.	{ 40 tons 40-in. pipe, Class B } { 58 tons 30-in. pipe, Class A } { 25 tons 30-in. pipe, Class B } { 50 tons specials for 30-in. and 40-in. pipes }	\$23.90 per ton. \$50.40 " " " " " " " " " " " "	On account, for the Boston Transit Commission.		
" 17,	Hancock Inspirator Co. .	{ Furnishing 36 spare valves and seats for Mystic Pumping-engine No. 4 }	\$9.85 each.			
" 26,	E. J. Bowes	Blasting, Wait street, Roxbury	\$5.90 per cubic yard.			
" 28,	Thomas Burke	Blasting, Middleton avenue, Dorchester	\$4.00 " " " " " " " " " " " "			
" 28,	{ Warren Foundry and Ma- chine Company }	Furnishing 15 tons special castings (for dupli- cates in cases of emergency)	2½ cents per pound f.o.b. cars, Boston.			
1896.						
Jan. 24,	Martin F. Kelley	Blasting, Howard avenue, Dorchester	\$3.99 per cubic yard.			

In the appendices annexed hereto will be found the reports of the City Engineer and the several Superintendents. They show in detail the present condition of the works and what has been accomplished.

Respectfully,

JOHN R. MURPHY,

Water Commissioner.

APPENDIX A.

REPORT OF THE WATER-INCOME DIVISION.

CITY HALL, BOSTON, February 1, 1896.

HON. JOHN R. MURPHY,

Water Commissioner:

SIR: Agreeable to the request of January 31, I herewith submit the doings of the Income Division for the preceding financial year, ending January 31, 1896.

The receipts and expenditures of the Division were:

RECEIPTS.

	Cochituate.	Mystic.	Total.
For water off and on for repairs .	\$2,248 50	\$484 50	\$2,733 00

EXPENDITURES.

	Cochituate.	Mystic.	Total.
Salaries	\$51,054 90	\$13,168 30	\$64,223 20
Travelling expenses	1,651 85	546 66	2,198 51
Printing and stationery . . .	1,509 70	339 92	1,849 62
Miscellaneous	3,369 92	608 25	3,978 17
Total	\$57,586 37	\$14,663 13	\$72,249 50

TABLE I.

	COCHITUATE.	MYSTIC.				Totals.
	Boston, excluding Charlestown.	Charlestown.	Somerville.	Chelsea.	Everett.	
Number of takers by annual rates	85,183	6,905	13,383	6,727	4,938	117,136
Number of takers by meter .	4,049	186	115	104	28	4,482
Number of takers of all kinds,	89,232	7,091	13,498	6,831	4,966	121,618

TABLE II.

Showing the purposes for which water was taken by Annual Rates, and the districts where taken.

PURPOSES FOR WHICH WATER WAS TAKEN BY ANNUAL RATES.	COCHIT- UATE.	MYSTIC.				Totals.
	Boston, ex- cluding Charlestown.	Charlestown.	Somerville.	Chelsea.	Everett.	
Armories	3	3	.	1	.	7
Bakeries	249	21	11	21	5	307
Bath-houses	5	.	.	.	.	5
Building purposes	1,401	9	351	79	179	2,019
Cattle-yards	1	1	.	.	.	2
Cemeteries	10	.	.	1	.	11
Churches	212	12	23	15	9	271
Clubs	91	27	11	30	3	162
Depots	19	.	7	1	5	32
Disinfecting-places	1	.	.	.	.	1
Dwelling-houses	47,274	4,811	8,058	4,766	3,171	68,080
Fire Department:						
Chemical engines	8	.	.	.	.	8
Combination wagons	3	.	.	.	.	3
Hose companies	5	.	.	.	.	5
Hydrants	6,031	272	115	85	32	6,535
Ladder companies	15	.	.	.	.	15
Steam-engines	40	6	8	6	2	62
Fire-pipes	337	42	12	9	2	402
Fountains	20	6	10	6	3	45
Freight-houses	2	11	.	.	.	13
Greenhouses	75	.	18	3	8	104
Gymnasiums	2	.	.	.	.	2
Halls	76	11	11	6	4	108
Hand-hose	8,527	270	2,719	608	741	12,865
Hospitals and asylums	47	.	.	1	.	48
Hotels	1	.	.	.	.	1
Laundries	367	31	28	27	11	464
Libraries	8	1	1	1	.	11
Manufactories . . . . .	.	3	15	24	7	49
Model houses	6,612	381	390	187	90	7,660
Morgue	1	.	.	.	.	1
Motor	4	.	1	1	.	6
Offal-stations	2	.	.	.	.	2
Offices	1,471	35	17	56	22	1,601
Photograph-rooms	22	1	1	2	1	27
Police-stations	6	1	.	.	1	8
Public buildings	17	1	1	.	.	19
Restaurants	280	12	3	9	2	306
Saloons	429	42	.	.	.	471
Schools	117	6	6	3	4	136
Sewers	1	7	2	1	.	11
Shops	2,665	171	110	109	27	3,082
Shipping	38	1	.	.	.	39
Stables	3,290	327	1,188	344	489	5,638
Steam-engines	269	24	2	8	.	303
Steam-rollers	6	.	.	.	.	6
Stone-crushers	5	.	1	1	1	8
Stores	5,107	359	262	315	118	6,161
Theatres (special)	4	.	.	.	.	4
Urinals (public)	1	.	.	.	.	1
Washing carts	3	.	.	.	.	3
Watering streets	3	.	1	1	1	6
Totals	85,183	6,905	13,383	6,727	4,938	117,136

TABLE III.

PURPOSES FOR WHICH WATER WAS TAKEN BY METER.	COCHIT- UATE.	MYSTIC.				Totals.
	Boston, ex- cluding Charlestown.	Charlestown.	Somerville.	Chelsea.	Everett.	
Bakeries	10	4	.	1	.	15
Baths	6	.	.	.	.	6
Boarding	58	.	1	1	.	60
Bottling	34	1	.	.	.	35
Breweries	24	2	.	.	.	26
Cemeteries	3	.	.	.	1	4
Chemicals	8	2	.	.	.	10
Club-houses	22	.	.	.	.	22
Distilleries	5	1	1	.	.	7
Electrical companies	6	.	1	1	.	8
Elevators and motors	512	6	6	6	3	533
Factories	262	30	21	39	6	358
Fish-houses	32	.	.	.	.	32
Gas companies	13	2	.	2	.	17
Greenhouses	12	.	1	.	2	15
Halls	4	3	.	.	.	7
Hospitals	18	.	2	2	.	22
Hotels	94	6	2	.	.	102
Ice-manufacturing companies	1	1	.	.	.	2
Iron-works	33	3	1	1	1	39
Laundries	10	2	.	3	1	16
Marble-works	1	.	.	.	.	1
Markets	7	.	.	.	.	7
Mills and engines	25	9	5	2	.	41
Models	706	18	6	1	.	731
Navy Yard and barracks . . . . .	.	2	.	.	.	2
Offices, stores, and shops	1,077	11	16	10	3	1,117
Oil-works	6	1	.	2	.	9
Parks	10	1	.	.	.	11
Police-stations	15	1	1	.	.	17
Public buildings	35	2	4	4	.	45
Saloons and restaurants	278	4	.	.	.	282
Schools	240	11	17	9	6	283
Slaughtering-houses	18	.	3	.	.	21
Stables	301	46	18	13	4	382
Steam and street R.R. co's	68	13	8	4	1	94
Stone-works	6	.	.	.	.	6
Sugar-refineries	1	.	.	.	.	1
Tanneries	4	.	.	.	.	4
Theatres	13	.	.	1	.	13
Warehouses	7	.	.	1	.	8
Wharves and shipping	64	4	1	2	.	71
Totals	4,049	186	115	104	28	4,482

TABLE IV.

QUANTITIES TAKEN BY METER.	COCHITU- ATE.	MYSTIC.				Totals.
	Boston, ex- cluding Charlestown.	Charlestown.	Chelsea.	Somerville.	Everett.	
	<i>Cubic feet.</i>	<i>Cubic feet.</i>	<i>Cubic feet.</i>	<i>Cubic feet.</i>	<i>Cubic feet.</i>	<i>Cubic feet.</i>
Bakeries	808,000	674,000	54,000			1,536,000
Baths	854,000					854,000
Boarding	2,747,000		14,000	18,000		2,779,000
Bottling	3,238,000	34,000				3,272,000
Breweries	22,840,000	2,118,000				24,958,000
Cemeteries	282,000			28,000	28,000	338,000
Chemicals	588,000	146,000				734,000
Club-houses	5,384,000					5,384,000
Distilleries	787,000	201,000		176,000		1,164,000
Electrical companies	35,971,000		887,000	1,311,000		38,169,000
Elevators and motors,	50,455,000	288,000	146,000	146,000	22,000	51,057,000
Factories	41,513,000	2,931,000	5,606,000	2,558,000	99,000	52,707,000
Fish-houses	2,726,000					2,726,000
Gas companies	11,722,000	1,723,000	52,000			13,497,000
Greenhouses	598,000			3,000	37,000	638,000
Halls	880,000	106,000				986,000
Hospitals	9,096,000		703,000	2,154,000		11,953,000
Hotels	40,707,000	423,000		123,000		41,253,000
Ice-manufg. companies	3,517,000	249,000				3,766,000
Iron-works	5,105,000	299,000	45,000	22,000	268,000	5,739,000
Laundries	3,578,000	423,000	121,000		186,000	4,308,000
Marble-works	71,000					71,000
Markets	375,000					375,000
Mills and engines	4,609,000	1,994,000	542,000	264,000		7,409,000
Models	47,331,000	1,357,000	38,000	323,000		49,049,000
Navy Y'd and barracks		4,606,000				4,606,000
Offices, stores, and shops	92,005,000	269,000	297,000	606,000	47,000	93,224,000
Oil-works	704,000	25,000	104,000			833,000
Parks	1,002,000	49,000				1,051,000
Police-stations	1,691,000	35,000		66,000		1,792,000
Public buildings	17,363,000	3,640,000	1,646,000	146,000		22,795,000
Saloons and restaurants	23,681,000	111,000				23,792,000
Schools	8,686,000	522,000	143,000	668,000	237,000	10,256,000
Slaughtering-houses	1,116,000			13,607,000		14,723,000
Stables	14,180,000	1,487,000	420,000	797,000	139,000	17,023,000
Steam and street R.R. companies	69,696,000	25,664,000	2,859,000	11,126,000	151,000	109,496,000
Stone-works	569,000					569,000
Sugar-refineries	32,035,000					32,035,000
Tanneries	306,000					306,000
Theatres	2,803,000					2,803,000
Warehouses	4,517,000		490,000			5,007,000
Wharves and shipping,	21,974,000	3,069,000	459,000	55,000		25,557,000
Totals	588,110,000	52,443,000	14,626,000	34,197,000	1,214,000	690,590,000

Table V.

AMOUNTS ASSESSED BY METER.	COCHIT- UATE.	MYSTIC.				Totals.
	Boston, excluding Charlestown.	Charlestown.	Somerville.	Chelsea.	Everett.	
Bakeries	\$1,062 70	\$848 00	.. . . .	\$76 20	.. . . .	\$1,986 90
Baths	1,005 40	.. . . .	.. . . .	.. . . .	.. . . .	1,005 40
Boarding	3,646 40	.. . . .	\$28 20	19 60	.. . . .	3,694 20
Bottling	4,417 85	47 60	.. . . .	.. . . .	.. . . .	4,465 45
Breweries	27,963 60	2,569 40	.. . . .	.. . . .	.. . . .	30,533 00
Cemeteries	365 60	.. . . .	.. . . .	.. . . .	\$39 20	404 80
Chemicals	822 20	195 10	.. . . .	.. . . .	.. . . .	1,017 30
Club-houses	6,378 30	.. . . .	.. . . .	.. . . .	.. . . .	6,378 30
Distilleries	1,071 65	264 10	233 70	.. . . .	.. . . .	1,569 45
Electrical compa- nies	37,917 60	.. . . .	1,597 20	1,088 40	.. . . .	40,603 20
Elevators and motors	66,862 65	408 80	172 40	218 60	45 00	67,707 45
Factories	51,280 50	3,825 21	3,359 80	7,197 90	3,066 70	68,730 11
Fish-houses	3,534 20	.. . . .	.. . . .	.. . . .	.. . . .	3,534 20
Gas companies	15,771 20	1,552 40	.. . . .	72 80	.. . . .	17,396 40
Greenhouses	810 70	.. . . .	15 00	.. . . .	51 80	877 50
Halls	1,095 60	131 60	.. . . .	.. . . .	.. . . .	1,227 20
Hospitals	11,207 00	.. . . .	2,632 00	892 60	.. . . .	14,731 60
Hotels	50,181 90	578 30	171 20	.. . . .	.. . . .	50,931 40
Ice-manufacturing companies	4,016 80	319 80	.. . . .	.. . . .	.. . . .	4,336 60
Iron-works	6,552 30	401 70	30 80	63 00	345 60	7,393 40
Laundries	4,919 40	551 20	.. . . .	168 80	247 20	5,886 60
Marble-works	91 20	.. . . .	.. . . .	.. . . .	.. . . .	91 20
Markets	524 00	.. . . .	.. . . .	.. . . .	.. . . .	524 00
Mills and engines	5,888 05	3,002 20	355 30	689 20	.. . . .	9,934 75
Models	64,214 17	1,898 30	504 70	53 20	.. . . .	66,670 37
Navy Yard barracks .. . . .	.. . . .	5,557 69	.. . . .	.. . . .	.. . . .	5,557 69
Offices, stores, and shops	123,281 00	381 60	847 60	445 10	71 00	125,026 30
Oil-works	962 10	35 00	.. . . .	147 80	.. . . .	1,144 90
Parks	1,317 20	67 00	.. . . .	.. . . .	.. . . .	1,384 20
Police-stations	2,246 30	49 00	92 30	.. . . .	.. . . .	2,387 60
Public buildings	21,419 30	4,416 00	197 20	2,036 80	.. . . .	28,069 30
Saloons and restau- rants	31,267 35	162 40	.. . . .	.. . . .	.. . . .	31,429 75
Schools	11,638 00	730 90	937 20	219 60	329 50	13,855 20
Slaughtering-houses	1,434 30	.. . . .	13,968 40	.. . . .	.. . . .	15,402 70
Stables	19,680 40	2,674 00	1,101 40	596 90	190 00	24,242 70
Steam and street railroads	70,454 37	26,638 60	10,784 80	3,493 70	223 30	111,594 77
Stone-works	761 60	.. . . .	.. . . .	.. . . .	.. . . .	761 60
Sugar-refineries	27,252 00	.. . . .	.. . . .	.. . . .	.. . . .	27,252 00
Tanneries	409 80	.. . . .	.. . . .	.. . . .	.. . . .	409 80
Theatres	2,256 40	.. . . .	.. . . .	.. . . .	.. . . .	2,256 40
Warehouses	3,137 70	.. . . .	.. . . .	612 00	.. . . .	3,749 70
Wharves and ship- ping	22,348 60	3,748 80	76 30	574 40	.. . . .	26,748 10
Totals	\$711,467 39	\$61,054 70	\$37,105 50	\$18,666 60	\$4,609 30	\$832,903 49

TABLE VI.

Showing the amounts assessed for water taken by Annual Rates, the purposes for which and the places where taken.

AMOUNTS ASSESSED BY ANNUAL RATES.	COCHITUATE.	MYSTIC.				Totals.
	Boston, ex- cluding Charlestown.	Charlestown.	Somerville.	Chelsea.	Everett.	
Armories	\$93 00	\$56 50		\$15 00		\$164 50
Bakeries	3,188 09	276 50	\$148 00	276 00	\$71 00	3,959 59
Bath-houses . . .	218 00					218 00
Build'g purposes, .	12,911 15	53 20	1,630 01	309 96	553 49	15,457 81
Cattle-yards . . .	15 00	10 00				25 00
Cemeteries	96 00			5 00		101 00
Churches	2,464 08	161 50	232 50	187 50	97 50	3,143 08
Clubs	1,647 51	270 41	166 58	298 50	45 00	2,428 00
Depots	305 09		122 50	19 50	84 00	531 09
Disinfect'g-places	25 00					25 00
Dwelling-houses, .	687,214 99	63,164 42	104,862 08	61,754 62	36,286 13	953,282 24
Fire Department:						
Chemical-						
engines	120 00					120 00
Combination						
wagon	45 00					45 00
Hose companies, .	75 00					75 00
Hydrants	120 62	544 00	3,220 00	2,418 00	896 00	19,140 00
Ladder com-						
panies	225 00					225 00
Steam engines, .	1,000 00	127 00	164 00	129 58	57 50	1,478 08
Fire-pipes	6,096 84	650 00	240 00	135 00	30 00	7,151 84
Fountains	423 00	60 00	55 00	50 00	25 00	613 00
Freight-houses . .	10 00	65 50				75 50
Greenhouses . . .	1,329 17		119 00	34 00	59 00	1,541 17
Gymnasiums . . .	32 00					32 00
Halls	1,014 32	146 50	113 00	113 00	109 17	1,495 99
Hand-hose	42,635 00	1,350 00	13,595 00	3,040 00	3,705 00	64,325 00
Hospitals and asy-						
lums	3,917 00			20 00		3,937 00
Hotels	150 00					150 00
Laundries	6,710 71	546 67	509 67	502 50	194 50	8,464 05
Libraries	100 00	10 00	24 00	12 00		146 00
Manufactories . . .		27 00	213 30	278 67	64 00	582 97
Model houses . . .	140,985 06	7,043 84	7,718 57	3,855 08	1,806 95	161,409 50
Morgue	10 00					10 00
Motor	19 58		5 00	35 00		59 58
Offal-stations . . .	225 00					225 00
Offices	12,156 19	298 33	179 50	465 58	171 16	13,270 76
Photograph-r'ns, .	457 35	24 00	22 00	35 00	17 00	555 35
Police-stations . .	90 42	23 00			20 00	133 42
Public buildings, .	7,647 50	44 50	170 00			7,862 00
Restaurants	5,502 87	203 00	55 00	147 83	32 50	5,941 20
Saloons	15,313 05	1,713 57				17,026 62
Schools	1,695 62	18 00	78 00	33 50	64 00	1,949 12
Sewers	500 00	86 38	90 00	100 00		776 38
Shops	21,937 46	1,201 76	710 32	879 58	155 42	24,884 54
Shipping	1,211 74	3 00				1,214 74
Stables	23,463 67	2,680 70	5,805 86	1,682 81	1,904 30	35,537 34
Steam-engines . . .	3,549 13	279 00	24 00	126 00		3,978 13
Steam-rollers . . .	150 00					150 00
Stone-crushers . . .	125 00		152 00	10 00	24 40	311 40
Stores	53,209 91	3,096 51	2,246 85	2,965 16	866 09	62,384 52
Theatre (special) .	163 12					163 12
Urinals (public) . .	5 00					5 00
Washing carts . . .	150 00					150 00
Watering streets, .	796 00		4,294 32	603 04	443 68	6,137 04
Totals	\$1,073,486 62	\$84,294 79	\$146,966 06	\$80,537 41	\$47,782 79	\$1,433,067 67

TABLE VII.

Shows the Number and Amounts of Abatements Allowed in 1895, and the Several Districts where Water was Taken.

ABATEMENTS.	COCHITUATE.		MYSTIC.							
	Boston, excluding Charlestown.		Charlestown.		Chelsea.		Somerville.		Everett.	
	No.	Amount.	No.	Amount.	No.	Amount.	No.	Amount.	No.	Amount.
On account of Assessments.										
1895.	2,848	\$17,592 66	209	\$918 95	252	\$1,044 77	245	\$1,174 41	158	\$720 08
1894.	174	10,743 01	100	873 73	183	1,189 17	272	1,708 75	128	765 30
1893.	1,240	17,473 54								
1892.	2	304 80								
Totals	4,264	\$46,114 01	309	\$1,792 68	435	\$2,233 94	517	\$2,883 16	286	\$1,485 38

Total number 5,811 Total amount \$54,509 17

The abatements allowed on account of 1895 assessments, to the amount of \$17,592.66, were due to changes in occupancy of premises, changes in ownership, vacancies, errors in valuation and assessments, inaccuracy of meters as proved by tests, underground leaks for which the owner could not be held entirely responsible, and for other reasons which, in the judgment of the General Superintendent, entitled the water-taker to consideration.

The Abatements on account of 1894, 1893, and 1892 were allowed for the following reasons:

	Overcharges, changes in premises, vacancies, errors in valuation, assessments.	City Accounts.	Uncollectible—Change of ownership, failures, shut off for non-payment, cleaning up of old accounts.	Consolidation of N.Y., N.H. & H. R.R. Co. accounts.	Fire-pipes.	Total.
1894.	\$1,455 18	\$6,446 68	\$2,093 95	\$747 20	. . . . .	\$10,743 01
1893.	1,259 20	3,653 60	12,270 74	. . . . .	\$290 00	17,473 54
1892. . . . .	. . . . .	. . . . .	304 80	. . . . .	. . . . .	304 80

Tables VIII. and IX. represent the work of the Off and On Service, as follows :

TABLE VIII.

NEW ELEVATOR, MOTOR, FIRE, AND SERVICE PIPES.	COCHIT- UATE.	MYSTIC.				Totals.
	Boston, ex- cluding Charlestown.	Charlestown.	Somerville.	Chelsea.	Everett.	
Elevator	15	• • • •	• • • •	• • • •	• • • •	15
Motor	8	• • • •	• • • •	• • • •	• • • •	8
Fire	26	1	•	•	•	27
Service	2,632	38	429	130	265	3,494
Totals	2,681	39	429	130	265	3,544

TABLE IX.

TURNING WATER OFF AND ON.	COCHIT- UATE.	MYSTIC.				Totals.
	Boston, ex- cluding Charlestown.	Charlestown.	Somerville.	Chelsea.	Everett.	
For repairs in mains	1,342	• • • •	• • • •	• • • •	• • • •	1,342
For repairs in service	4,854	387	186	170	131	5,728
For non-payments	1,977	98	153	198	148	2,574
For waste	13	• • • •	• • • •	• • • •	• • • •	13
Turning on first time	2,224	58	358	94	305	3,039
Totals	10,410	543	697	462	584	12,696

TABLE X.

Showing the kinds of fixtures in use January 31, 1896, their number, and the districts wherein located.

FIXTURES IN USE JANUARY 31, 1896.	COCHIT- UATE.	MYSTIC.				Total.
	Boston, ex- cluding Charlestown.	Charlestown.	Somerville.	Chelsea.	Everett.	
Bath-tubs	48,755	1,613	6,450	2,170	2,622	61,610
Bowls	78,541	2,423	6,625	2,749	2,415	92,753
Foot-tubs	513	5	2	1		521
Sinks	133,081	11,830	15,428	9,471	5,045	179,855
Taps	18,457	1,056	3,054	1,026	790	24,383
Urinals	4,611	152	56	85	24	4,928
Wash-tubs	70,313	2,068	7,464	2,303	2,210	84,358
Water-closets	115,138	8,134	13,148	6,988	3,561	146,969
Totals	474,409	27,281	52,227	24,793	16,667	595,377

The Waste Detection report for the year is as follows :

Premises on which defective fixtures were found	7,970
Premises reexamined	8,150
Second notices to repair	595
Wilful-waste notices issued	39

The defective fixtures may be divided into the following classes :

Ball-cocks and valves	5,282
Sink, hopper, bowl, and bath faucets	3,551
Service-pipes burst	407
Wilful waste	39

Most respectfully submitted,

J. H. CALDWELL,
General Superintendent Income Division.

APPENDIX B.

REPORT OF THE RESIDENT ENGINEER AND
SUPERINTENDENT OF THE WESTERN DIVI-
SION.

SOUTH FRAMINGHAM, January 1, 1896.

CHARLES W. SMITH, Esq.,
Water Commissioner:

SIR: The annual report for the Western Division of the Boston Water Works is herewith submitted.

SUDBURY-RIVER BASINS.

Water-shed, 75.2 Square Miles.

The rainfall for 1895 was 51.40 inches at Framingham, and 45.96 inches at Chestnut-Hill Reservoir. The mean rainfall on the Sudbury-River water-shed was 50.75 inches, which is about 2.75 inches above the average.

This abundant rainfall has enabled us to keep up the full supply to the city. A season of extreme drought would find the city still behind in its supply, but the completion of Basin No. 5, now well under way, will meet every demand for several years and until the Metropolitan works are completed, when the question of quantity will be finally settled.

Probably the largest fall of rain in a single and continuous storm that has ever been registered in Boston since accurate records have been kept occurred October 12-14, 1895. The Weather Bureau record seems to be defective, inasmuch as only slightly over five inches was reported from this station. The Boston Water-Works gauges having been located with care and near the surface of the ground can be depended upon, especially since there are at Chestnut-Hill Reservoir several gauges which act as a check on each other. Any gauges situated on the tops of high buildings are likely to give unsatisfactory results, on account of the effects of the wind.

Rain began to fall in Boston at 1.30 P.M. on Saturday, October 12, and ceased at 4.15 A.M. on Monday, October

14, 1895. The following are the amounts of rain collected in the different gauges on the Boston Water-Works :

Locality.	Rainfall. Inches.
Chestnut-Hill Reservoir	7.45
Chestnut-Hill Reservoir	7.55
West Medford	7.42
Lake Cochituate	6.95
Framingham	8.49
Ashland	7.50
Cordaville	7.60
Cordaville	7.90

This great rain of 7.5 inches (in round numbers) in less than thirty-nine hours would certainly have produced very great freshets in the rivers had the rain occurred when the ground was frozen or when the water tables were high and the streams full. As it was, the ground was exceedingly dry and absorbed readily a large proportion of the rain. On the Sudbury river the maximum flow in twenty-four hours represented about one-half inch collected over the water-shed, a very small amount. The rate of rainfall at any portion of the storm, as shown by the self-recording rain-gauge, was remarkably uniform and not large.

Plans and specifications were completed early in the year for stripping the loam and muck from about one-half the area of Basin No. 5, and the contracts advertised in April. The following table shows the names of the bidders to whom the contracts were awarded, with the dates, prices per cubic yard for earth excavation, and the amounts of the contracts. Section "A" was let the previous season. A series of filter beds was planned in connection with the basin to filter the water from one of the brooks flowing through the city of Marlboro'. The whole work included in all of these sections covered all of the contemplated improvements on the southern half of the basin, with the exception of the bridge under the N.Y., N.H., & H. R.R.

NAMES.	Work.	Price per cu. yd.	Date Contract.	Amount.
John Berry	Filter-beds, Marlboro' .	\$0 23	April 29 .	\$3,950
A. Michelinì & Jos. Cenedella	2 Portions Fram.-Marl. Road	0 21	April 22 .	10,607
Moulton & O'Mahoney	Section B	0 29	June 12 .	68,788
Malone & Strang	" C	0 21	April 29 .	82,160
Auguste Saucier	" D	0 21	June 25 .	67,691
Chas. Linehan	" E	0 23	April 29 .	48,070
Newell & Snowling	" F	0 26	" " .	46,020
Chas. Linehan	" G	0 19	" " .	24,510
Moulton & O'Mahoney	" H	0 26	" " .	47,060
Henry Parsons	Iron fences . . . . .	...	July 17 .	

The work on these sections has been half completed, and as the whole basin will be seized by the Metropolitan Water Board in a few days, the completion of this portion of the Boston Water Works will rest with the Commonwealth.

Work on this dam has progressed rapidly during the year. The masonry section has been carried from grade 190 to grade 217, and the earth embankment at the northerly end of the dam has been carried to grade 210, and the southerly embankment to grade 224.

Owing to past experience with epidemics of typhoid fever among the workmen where such extensive works are undertaken, a Medical Inspector was appointed early in the season, and a set of sanitary rules adopted for the regulation of latrines and to prevent contamination of the water supply. The rules were printed on cloth in English and Italian and properly posted. The effect of this course has been excellent.

No unusual growths of Algæ have occurred this year in the sources of supply. The color of the water in the city taps has averaged 0.64 at Park Square, and 0.54 at Mattapan (Platinum Scale).

Extensive tracts of land have been secured in Cedar Swamp for the better carrying out of the drainage scheme already devised, but no construction has as yet been undertaken.

Plans for a new dam at Whitehall Pond have been perfected.

An extended series of experiments was made during the year to determine the effects of sixteen years of tuberculation on the interior of the 48-in. mains at the Rosemary siphon of the Sudbury Aqueduct. The results were

fully published in the Transactions of the American Society of Civil Engineers, and showed that the carrying capacity of the pipes had been diminished 25% by the growths of tubercles. These were removed from one of the lines of pipe without material injury to the original coating, and the line then carried practically as much water with the same losses of head as when first laid.

For ordinary velocities the coefficient "c" in the Chezy formula $V = c\sqrt{RI}$ was found to be 110 for the incrustated mains and 140 for the clean pipes. On February 2 the weirs were all removed from the aqueduct and the normal flow resumed.

The town of Ashland made another effort in March to secure legislation for damages from the city for lands taken in years past and for which settlements had already been made with the private owners, but were again unsuccessful.

In January and February a large and substantial weir 10 feet long was erected at Fisher-Hill Reservoir to measure the flow from the new pumping machinery of the High Service Supply erected at Chestnut-Hill Reservoir. A preliminary test by the students of the Institute of Technology has been made, but the final test of the pumps has not yet been arranged.

The most important event of the year in connection with the Boston Water Works was the passage of an Act, approved June 5 (and printed in full in the Appendix), to provide for a Metropolitan water supply. Under the provisions of this bill the Commonwealth has undertaken the duty of supplying the Metropolitan District with its water.

On June 29 the title of Superintendent of the Western Division was changed to that of General Superintendent of the Western Division.

BASIN 1.

Grades, H.W., 161.00; Tops of Flash-boards, 159.29 and 158.41; Crest of Dam, 157.54. Area, Water Surface, 143 acres; Greatest Depth, 14 ft.; Contents, below 161.00, 376,900,000; below 159.29, 288,400,000 gals.

On January 1, 1895, water in this basin stood at elevation 156.50, and remained at about this level until January 11, when it commenced to rise, and on January 13 was wasting over the stone crest. Waste continued until February 1. The surface then fell, and remained about one foot below the stone crest until March 11, when waste over the stone crest again commenced and continued until May 9, when both sets of flash-boards were placed in position. From May 20 to June 11 water was wasting over the flash-boards.

By July 30 the water-surface had fallen to 158.54; there

was a sudden rise to 158.91 on July 31, after which it fell again, reaching 158.11 on October 12, when it began to rise. The flash-boards were removed on October 16, and water was wasted over the stone crest for the remainder of the year.

The only waste of water through the flood gates was on October 13, 14, and 15.

The highest elevation reached during the year was 159.33, on May 23; and the lowest, 156.17 on January 2.

Water was drawn from this basin for the supply of the city from 7 A.M., January 1, to 2 P.M., April 8.

The slope paving at the dam, above elevation 158.00, was relaid in the autumn.

BASIN 2.

Grades, H. W., 168.00; Tops of Flash-boards, 167.12 and 166.49; Crest of Dam, 165.87. Area, Water Surface, 13.4 acres; Greatest Depth, 17 ft.; Contents, below 168.00, 568,300,000; below 167.12, 529,860,000 gals.

On January 1, 1895, water in this basin stood at elevation 166.00 and was flowing over the stone crest, and this overflow continued until February 10. The surface then fell gradually, reaching elevation 161.22 on March 1, when it began to rise; and on March 10 water was again flowing over the stone crest. It continued to overflow until May 9, when both sets of flash-boards were placed in position. From May 15 to May 17 water was flowing over the flash-boards. The surface then fell, and on July 3 had reached elevation 163.54.

From July 3 to October 13 the water was kept between elevations 163.00 and 163.50, by drafts from Basins 4 and 6. On October 13 the surface rose rapidly, and water was flowing over the flash-boards from October 14 to October 20, and again from November 1 until the flash-boards were removed. The upper set of flash-boards was removed on November 5, and the lower on November 6. During the remainder of the year the water was flowing over the stone crest.

The highest elevation reached by the water-surface was 167.32, on November 3; and the lowest, 161.22, on March 1.

Water for the supply of the city was drawn wholly from this basin from 11.40 A.M., June 27, to 11 A.M., July 19; from 7 A.M., July 24, to 12 M., October 1; from 10 A.M., October 13, to 11 A.M., October 24; from 11 A.M., November 25, to 7 A.M., December 2; from 5 P.M., December 2, to 11 A.M., December 3; and from 11 A.M., December 23, to the end of the year.

Water was drawn partly from this basin and partly from Basin 3, from 2 P.M., April 8, to 11.40 A.M., June 27; from 11 A.M., July 19, to 7 A.M., July 24; from 2 P.M., October 3, to 10 A.M., October 13; from 11 A.M., Octo-

ber 24, to 11 A.M., November 25; from 7 A.M. to 5 P.M., December 2; and from 1 P.M., December 5, to 11 A.M., December 23.

A new fence has been built on the northerly side of Union Street, Ashland, by the South Middlesex Street Railway Company to replace the fence which was removed when the street was widened by the town. This fence is on the relocated street line of the city's land, at the head of the basin.

The town of Ashland has widened Fountain Street along the line of the property of the city, taking a narrow strip of the city's land for this purpose. I advise that steps be taken to secure compensation therefor.

Very few organisms were present during the year 1895. The average number for the year was 55 per c.c., and the amorphous matter was 374 per c.c.

BASIN 3.

*Grades, H. W., 177.00; Crest of Dam (no flash-boards), 175.24.
Area at 177.00, 253 acres; Contents, below 177.00, 1,224,500,000 gals.
Area at 175.24, 248 acres; Contents, below 175.24, 1,081,500,000 gals.
Greatest depth, 21 feet.*

On January 1, 1895, water in this basin stood at elevation 175.24, the top of the stone crest. On January 12 it began to overflow, and continued until February 6. On March 2 the surface had fallen to 172.21, but on March 11 it flowed over the crest again, and continued to overflow until May 7. During the remainder of May the surface was a little below elevation 175.00, but in June it began to fall, and by June 27 it had receded to elevation 169.08; it then began to rise, and by July 14 had reached elevation 170.04. During the remainder of July it was very nearly stationary, but in August it rose again to elevation 172.50 on September 1, and it remained at about this level until October 4, after which it fell again, reaching elevation 171.03 on October 14. The water then rose rapidly, and on October 15 it flowed over the crest, and continued to overflow, except on October 29 and November 16, for the remainder of the year.

The highest elevation reached was 176.21, on March 15; and the lowest, 169.08, on June 27.

The water for the supply of the city has at no time during the year been drawn wholly from this basin. Water has been drawn partly from this basin and partly from Basin 2 on the dates already given under the head of Basin 2.

The joints between the stones in the overflow at the dam have been in bad condition for some years, and this year they were cleaned out and pointed with Portland cement mortar. It was found necessary to scrape some of the joints to a depth of eighteen inches or more.

Advantage was taken of this opportunity to point the joints in the wing-wall of the overflow, and in some parts of the substructure of the gate-house, which were in poor condition.

The paving in front of the overflow has been relaid, and the rip-rap below it brought up to grade where accessible.

The algæ growths were exceptionally heavy in 1895. The diatoms appeared as usual in the spring and autumn. The spring growth did not begin till May, but continued into August. *Tabellaria* appeared first; they reached their highest development in June, but continued until August. In July *Stephanodiscus* were abundant. The fall growth of diatoms was heavier than the spring growth, but was of shorter duration. *Tabellaria* and *Asterionella* predominated.

Chlorophyceæ were present in July and in October, being chiefly *Protococcus* and *Closterium*.

The Cyanophyceæ were very abundant during the summer. *Cœlosphærium* appeared soon after the ice broke up. It increased steadily until the last of August. *Anabaena* appeared in July; it increased slowly for several weeks, and finally during the first week in September rose suddenly to very large numbers. Thus it happened that in September *Cœlosphærium* and *Anabaena* were both present in large numbers. On September 10 there were 1,360 standard units of *Anabaena* and 1,240 units of *Cœlosphærium* at the surface. The growth extended throughout the entire basin. The water at this time had a deep brownish color, characteristic of the coloring-matter of the Cyanophyceæ when seen by reflected light. When concentrated these organisms had a strong taste like that of uncooked sweet corn. The *Anabaena* disappeared by the middle of October, but the *Cœlosphærium* continued for another month.

Infusoria were found in small numbers throughout the summer.

The average number of organisms for the year was 550 per c.c., and of the amorphous matter, 466 per c.c.

Owing to the stripping and other work going on in Basin 5, which is but a short distance above Basin 3, the water has been of poor quality in the latter basin, and has been used but little for the supply of the city.

BASIN 4.

Grades, H. W., 215.21; Tops of Flash-boards, 215.21 and 214.89; Crest of Dam, 214.23. Area, Water Surface, 167 Acres; Greatest Depth, 49 feet; Contents, below 215.21, 1,416,400,000 gals.

On January 1, 1895, water in this basin was at elevation 196.18; it rose gradually, and on April 9 flowed over the

stone crest, and continued to overflow until May 10, when the lower set of flash-boards was placed in position. The water then rose, and on May 13 flowed over the boards. This overflow continued until May 24, when the upper set of flash-boards was put in place. The water rose and overflowed the flash-boards from May 29 to June 19 and from June 28 to July 3. On July 3 one of the outlet gates was opened to furnish water to Basin 2, and the water gradually fell, reaching elevation 191.84 on October 13, when the outlet gate was closed. The water immediately rose again, and on December 31 had reached elevation 213.59.

The highest elevation reached during the year was 215.39, on June 6; and the lowest, 191.78, on October 12.

Some repairs have been made to the gate-house and other buildings.

The new channel of Cold Spring brook, from Dam 4 to Main Street, and the waterway under Main Street, should be finished, for it may at any time become necessary to draw from Basin 4 a quantity of water which the brook in its present condition could not carry without flooding the meadows and rendering the city liable for damages.

The organisms in Basin 4 throughout the year were slightly higher than in 1894, but still very low. The average number for the year was 39 per c.c., and amorphous matter, 158 per c.c.

BASIN 6.

*Grades, H. W., 295.00; Top of Flash-boards, 295.00; Crest of Dam, 294.00.
Estimated Area, 185 Acres; Estimated Contents, 1,530,300,000 Gallons.*

On January 1, 1895, water in this basin stood at elevation 278.84. It then rose gradually, and flowed over the stone crest from April 4 to May 9, when the lower set of flash-boards was put in position. On May 19 water flowed over these boards, and continued to overflow until the upper set of flash-boards was put in place, on May 23. On May 29 water was flowing over the flash-boards, and the overflow continued until July 13, except June 20 to June 27. On July 13 an outlet gate was opened to supply water to Basin 2. The water then fell gradually to elevation 272.26 on October 13, when the gate was closed. The water immediately began to rise, and on December 26 was overflowing the stone crest. This overflow continued for the remainder of the year. The highest elevation reached during the year was 295.08, on June 6; and the lowest, 272.26, on October 12 and 13.

All of the elevations at Basin 6 are subject to a correction, as no good line of bench levels has yet been run to connect these with our permanent benches.

The present channel of the brook is insufficient to pass the quantity of water required during the summer, without flooding and consequent claims for damages. I recommend that surveys and plans be made for a new channel.

A force of men has been continually employed since March 30 in grading the grounds immediately below the dam and preparing filter beds.

A stone chamber with wooden cover has been built around the gate on the 36-inch pipe leading to filter bed No. 1. A brick measuring well with wooden roof has been erected at the outlet of the drain from Bed No. 1.

The water in both Basins 4 and 6 has been of excellent quality throughout the year, and the supply for the city during the summer was taken almost entirely from these sources.

Diatoms were present in small numbers from May to October. Chlorophyceæ were somewhat abundant in September and October. A few infusoria were present in the spring and fall. The average number of organisms for the year was 72 per c.c. ; of amorphous matter, 234 per c.c.

BASIN 8.

*Elevation, H.W., 327.91 ; Bottom of Gates, 317.78.
Area at 327.91, 601 acres ; Contents, between 327.91 and 317.78, 1,256,900,000
gallons.*

On January 1, 1895, water in this basin stood at elevation 323.23, or 4.68 feet below high water. It gradually rose to elevation 325.61 on March 25, and, although water was wasted at various times after this date to prevent the water from rising too rapidly, it reached elevation 326.96 on April 30. The water was kept at about this elevation, by occasionally wasting, until June 14, when the quantity wasted was increased, and the surface fell to elevation 325.90 on June 22. The water then fell slowly, the amount of waste being small, to elevation 323.22, on October 12, after which it rose, at first rapidly and then more slowly, to elevation 326.31 on November 27. The waste gate was opened on November 27, and on December 31 the water had fallen to elevation 325.35.

The highest elevation reached during the year was 327.01, on June 6 ; and the lowest, 323.22, on October 12.

Water was wasted at various times, both to regulate the height of the water and to furnish water to Basin 2 for the supply of the city. The outlet gate was closed and no water drawn from the basin from 7 A.M., January 1, to 7 A.M., March 25 ; from 7 A.M., April 5, to 7 A.M., April 9 ; from 7 A.M., April 12, to 7 A.M., April 15 ; from 7 A.M., April 20, to 7 A.M., April 30 ; from 6 P.M., May 9, to 7 A.M.,

May 10; from 6 P.M., May 16, to 7 A.M., May 18; from 7 A.M., May 23, to 7 A.M., June 14; from 10 A.M., June 22, to 7 P.M., June 23; from 6 P.M., July 24, to 6 P.M., August 8; and from 5 P.M., October 14, to 5 P.M., November 27.

Weir measurements of the waste have been taken as usual during the year, when the outlet gate was open and also when it was closed. Observations during the summer show that with Whitehall Pond brook in its present condition, very little water can be drawn from the basin without flooding the meadows along the entire length of the brook, and consequently making the city liable for damages.

The scows, dredger, and steamer are still in fair condition. The roof of the dredger has been shingled.

The Wood Bros. shoe factory has been sold and torn down, but the rubbish has not yet been cleaned up.

There is quite a large leak in the bulkhead in which the waste gates are located. This bulkhead should be renewed, unless the new dam is to be built soon.

FARM POND.

Grades, H. W., 149.25; Low Water, 146.00.

Area at 149.25, 159 acres; Contents, between 149.25 and 146.00, 165,500,000 gals.

On January 1, 1895, water in this pond was at elevation 148.79. On January 26 it had risen to elevation 149.03, and it remained at about this height until March 7. It then began to rise, reaching elevation 149.32 on March 14, and remained nearly at this elevation until June 9, when it receded, falling to elevation 149.00 on June 21. The height again remained nearly constant until August 21, when the water began to go down, reaching elevation 148.44 on October 11 and 12. This fall was followed by a rise, the surface reaching elevation 149.87 on November 28 and 29, when water was wasted into the Sudbury river; the water then fell, reaching elevation 149.36 on December 1, and remained a little above high water until the end of the year.

The highest elevation reached during the year was 149.87, on November 28 and 29; and the lowest, 148.44, on October 11 and 12.

No water for the supply of the city has been drawn from this pond during the year.

The Framingham Water Company has pumped from the pond 132,200,000 gallons during the year, an average of 362,192 gallons daily.

The total amount of waste was 34,900,000 gallons, of which 7,300,000 gallons were used in cleaning the aqueduct, and the remainder was wasted into the Sudbury river.

The paving on the slope at the south side of the influent chamber, which had settled in many places, has been taken up and relaid to grade. During the winter the coping on both sides of the entrance of Farm Pond sluice was moved out of place by the ice. This has been replaced, and heavy paving laid against it, to prevent, if possible, any future movement.

LAKE COCHITUATE.

Grades, H. W., 134.36; Invert of Aqueduct, 121.03; Top of Aqueduct, 127.36.
Area, Water Surface at 134.36, 785 acres.
Contents, between 134.36 and 127.36, 1,515,180,000 gals.; between 134.36 and 125.03, 1,910,280,000 gals.
Approximate Contents, between 134.36 and 121.03, 2,447,000,000 gals.; between 134.36 and 117.03, 2,907,000,000 gals.

On January 1, 1895, water in the lake was at elevation 126.28, or 8.08 feet below high water. On January 6 it had fallen to elevation 126.13, but by January 14 it had risen to elevation 126.55, and until March 9 it remained between elevations 126.50 and 127.00. On March 9 the water began to rise, and on March 10 water from the Sudbury-river basins began to flow into the lake; and on April 1, when the flow from the Sudbury sources was cut off, the water had risen to elevation 132.97. On April 14 it had risen to high-water mark, elevation 134.36. From this time until May 28 the surface was kept at about this height, by wasting from the lake in April, and by a few drafts from the Sudbury basins, in May. On May 28 the water began to fall, and, although the fall was checked temporarily by a draft from the Sudbury, in June, by October 12 the surface had fallen to elevation 128.27. At this time there was a heavy rain-fall, and the water rose in consequence, reaching elevation 133.05 on December 6, when the waste gate in the new dam was opened and the water drawn down, receding two feet below high water on December 15. For the remainder of the year the surface was kept at about this level by occasionally wasting water.

The amount of water wasted from the lake at the outlet dam was 285,000,000 gallons in April, and 372,600,000 gallons in December; a total of 657,600,000 gallons.

In January, 1,300,000 gallons were turned into the lake from the Sudbury sources; in March, 680,000,000 gallons; in May, 87,700,000 gallons; in June, 114,000,000 gallons; in October, 6,600,000 gallons; in November, 5,600,000 gallons; and in December, 1,600,000 gallons; or a total amount of 896,800,000 gallons.

All of the flash-boards have been in place on the crest of the outlet dam during the entire year.

Four of the stop-planks at the circular dam were removed

on March 19, and replaced on July 5. On September 23 nearly all of the stop-planks were removed, and that part of the lake above the circular dam was drawn down to allow repairs on the dam. These planks were not replaced during the year, as the temporary works at the new bridge of the Boston & Albany Railroad, just below the circular dam, maintained the water in the lake at the usual grade, and the stop-planks were not needed.

The sheet-piling core of the circular dam, which was rotten at the top, has been repaired by sawing off from eighteen to twenty-four inches and replacing by new sheet-piling, thoroughly spliced to the old. The slopes of the dam have also been brought up to grade, and repaved where necessary.

A small force of men and teams has been employed from September 30 to October 25 in grading and paving the banks of the pool between the old upper dam and the new dam. The paving of the north bank, which was not finished last year, was also completed. The work above the new dam is now entirely completed. In all, about 168 square yards of paving have been laid.

About 900 feet of fence have been built on the line between the city and Edward Hammond, on the east side of the lake, just south of Snake brook.

The Pegan filter beds have been in use the larger part of the time during the year.

The following table shows the total number of gallons of water pumped, the amounts delivered to each bed, etc., for each month of the year :

MONTH, 1895.	No. of Days on which Pumps were run.	AMOUNT OF WATER PUMPED.		AMOUNT OF WATER DELIVERED ON TO BEDS.		
		Total for the Month.	Average for each Day Pumps ran.	No. 1.	No. 2.	No. 3.
		Gallons.	Gallons.	Gallons.	Gallons.	Gallons.
January	29	28,379,000	978,600	6,746,000	8,819,000	12,814,000
February	26	14,246,000	547,900	1,394,000	3,317,000	9,535,000
March	31	40,062,000	1,292,300	11,457,000	18,203,000	10,402,000
April	30	38,064,000	1,268,800	10,175,000	9,648,000	18,241,000
May	21	19,824,000	944,000	3,618,000	9,686,000	6,520,000
June	17	12,474,000	733,800	527,000	3,128,000	8,819,000
July	15	13,756,000	917,100	1,432,000	829,000	11,495,000
August	9	7,952,000	883,600	754,000	3,241,000	3,957,000
September	8	5,653,000	706,600	603,000	151,000	4,899,000
October	18	21,030,000	1,168,300	2,714,000	4,711,000	13,605,000
November	29	39,836,000	1,373,700	9,987,000	6,181,000	23,668,000
December	29	32,422,000	1,118,000	7,090,000	8,301,000	17,031,000
For the Year . . .	262	273,698,000	1,044,600	56,497,000	76,215,000	140,986,000

The total amount of coal used during the year was 225,843 pounds; 1,211.9 gallons were pumped per pound of coal.

Water ran over the overflow in the dam across Pegan brook during the entire twenty-four hours on March 14, and for part of the day on March 13 and 15, April 14, 15, 16, 17, 18, 20, and 22, October 13 and 14, November 18, 26, 27, 28, and 29, and December 2.

Bed No. 1 was cleaned in May, June, August, and October; Bed No. 2 in May, July, and August; and Bed No. 3 in June, August, September, and October.

Considerable work was done early in the year in removing stumps, muck, etc., from the meadow to high ground.

The new location of the Boston & Albany Railroad crosses the filter beds. The railroad has built other filter beds to take the place of those destroyed. A considerable amount of filling in the lake has been done by the company on their new line during the year, and this filling has pushed up a large amount of mud, and otherwise has affected the quality of the lake water. Negotiations are now going on between the city and railroad authorities, and it is to be hoped that the evil will be properly remedied.

It was found that the Hoadley engine in use at the beds

was not large enough. It was consequently removed, on December 19, and replaced by one of the Atlas engines stored near the effluent gate-house.

The spring growth of diatoms in the lake was the lowest for many years. In the fall there was a vigorous growth of *Asterionella* followed by one of *Melosira*.

Protococcus was rather more abundant than usual during the summer.

In July and August there was considerable *Microcystis*, and in November *Anabæna* (the so-called "sterile form") was very abundant. At one time it rose to the surface, forming a thick scum, covering one or two acres in the Middle Division. When concentrated this organism had a strong odor not unlike that of a raw squash.

Infusoria were not abundant except for a short time after the "turning over."

Crenothrix was observed at the bottom in July and again in November.

The average number of organisms for the year was 360 per c.c., against 363 for 1894.

While the organisms in the lake do not show an increase over last year, the amount of matter in suspension has been very largely increased owing to the work on the B. & A. R.R., already referred to.

Feeders of Lake Cochituate.

Means of Monthly Observations (1895).

LOCALITY.	Temperature.	Color.	Organisms.	Amorphous.	Bacteria.
Beaver Dam brook	51.9	1.00	83	149	423
" " " mouth of brook . .	52.0	0.91	43	286	552
Course brook (last culvert)	53.5	0.88	50	158	207
Dug pond	56.5	0.21	387	271	149
Circular dam	51.3	0.88	57	141	295
Pegan brook	54.5	0.19	42	1,730	1,875
Snake brook	51.7	0.60	31	343	402

DUDLEY POND.

*Grades, H. W., 146.46; 18-inch Pipe, 130.36 and 127.36.
Area, Water Surface, 81 acres; Greatest Depth, 27 feet; Contents, above 130.36,
250,000,000 gals.*

On January 1, 1895, water in the pond was at elevation 139.96, or 6.50 feet below high water. The water gradually rose during the year, reaching elevation 143.53 on December 31.

No water has been drawn from this pond during the year.

SUDBURY-RIVER AQUEDUCT.

*Grades, 141.352 at Farm Pond; 124.051 at Terminal Gate-House.
Length, 15.89 miles; Size, 7 ft. 8 in. \times 9 ft.; Capacity, 109,000,000 gals. in 24 hours.*

The three portions of this aqueduct are in good condition. The Supply and Farm-pond aqueducts were cleaned twice by machine, on April 11 and December 12. The main aqueduct was cleaned once, by hand, from Farm pond to Station 400 on April 17 and 18, and from Station 400 to Chestnut-Hill Reservoir on May 2 and 3. The brick-work was very dirty as far as the Rosemary siphon. In the Beacon-street tunnel about 50 lbs. of rock which had fallen from the roof was found at Station 780+53. The concrete lining and railway track were in excellent condition.

The 48-in. pipes in Basin 1 have been flushed into the river below Dam 1 twice during the year.

The three portions of the aqueduct have been in use for the same length of time, 335.9 days. The flow was stopped only for the experiments at the siphon pipes, for cleaning the aqueduct, and for repairs at the Waban Valley and Charles-river bridges.

The amount of water sent to the city has been 12,908,500,000 gallons, a daily average of 35,366,000 gallons. Besides the above, 896,800,000 have been turned into Lake Cochituate.

Hitherto the machine used in cleaning the Supply and Farm-pond aqueducts has simply scraped or brushed the deposit from the masonry. In the autumn of this year a force pump was attached, operated by the movement of the cleaning-machine, to force water through a perforated iron pipe against the whole circumference of the aqueduct, thus washing off the material loosened by the brushes. The pump was tried in the December cleaning, and showed that, with some slight modifications, it will doubtless work successfully.

Extensive repairs were made on the Waban arches in October. This bridge has always given a great deal of trouble from cracks and leaks, and it was determined to

repair it thoroughly, and see if the work could be maintained in a permanent condition in spite of temperature changes to which the masonry is subjected. The plastering on the inside of the aqueduct was removed wherever it was found necessary, and the cracks were followed up, cut out to a depth of two inches, and carefully cleaned before pointing. Portland cement mortar, mixed one to one, was forced into the cracks with a calking-iron. The plastering was then restored. It is intended to watch carefully the results of the work. The aqueduct was found to be perfectly tight under a large flow of water by test made in November. It is expected that the cracks will open again under the effect of very low temperatures.

Charles-river bridge, which has also leaked to a considerable extent, was repaired in November. The plastering on the lines of the cracks was loose from the skew-back to a point about 6 inches above the springing line. It was removed, the cracks pointed and the plastering replaced.

The brick masonry of the aqueduct bridges should be thoroughly overhauled, oiled, and pointed during the summer. In some portions of the walls it will be necessary to cut out the bricks and insert new ones. The granite masonry of all the bridges requires pointing.

A considerable amount of work was done towards erecting an iron stairway to connect the upper levels of the bridge with the street which was made under one of the arches. Owing to lack of funds the work was suspended. The foundations were protected during the winter.

The usual attention has been given to the culverts along the line, especially during the cold months, when they are apt to fill up with snow and ice.

Mr. Oldham, in charge of the aqueduct force, was called to Dam No. 6 to take charge of the seeding of the embankments. He also acted as Inspector of Masonry at Dam 5 for two weeks.

A building for storage of tools is much needed, and I recommend that one be erected during the present year. The Westerly Siphon Chamber would be a good location for the building.

COCHITUATE AQUEDUCT.

*Grades, 121.03 at Lake ; 116.77 at Brookline Reservoir.
Length, 14.60 miles ; Size, 5 ft. \times 6 ft. 4 in. ; Capacity, 20,000,000 gals. per 24 hours.*

This aqueduct has been in constant service during the year, except from 5 P.M., February 24, to 5 A.M., February 28, when the flow was stopped for cleaning the interior.

From the lake to Station 25 there was a great amount of

Spongilla growing upon the walls, some of it being 4 inches in length. From Station 25 to Station 130, Division 1, the Spongilla gradually decreased, but the black deposit all along the line was worse than it has been for several years. The brick-work was given a double washing in the upper portions of the aqueduct as far as Station 35. From Station 130 to the Westerly Pipe Chamber there was a considerable amount of the Spongilla in some sections. From the Easterly Pipe Chamber to the Ventilator there was very little sponge, but it was abundant in the tunnel.

New galvanized-iron gate rods were inserted in the gates at Dedmans, Grantville, and Newton Centre Waste Weirs, and in the first two of the above structures new southern pine bulkheads were placed.

A depth of $6\frac{1}{2}$ feet has been maintained in the aqueduct, except from January 1 to March 11, when the lake was not high enough to furnish this flow.

CHESTNUT-HILL RESERVOIR.

*H. W., 125.00; Dam, 128.00; Effluent pipes, 99.80.
Area, Lawrence Basin, 37.5 acres; Contents, 166,000,000 gals.; Bradley Basin, 87.5
acres; Contents, 391,000,000 gals.
Total Contents above grade 100.00, 557,000,000 gals.*

The extension of Commonwealth avenue has cut through a portion of the driveway near the entrance arch and necessitated many changes. The arch which has marked the beginning of the drive must be taken down, and as it possesses no architectural merit and would be an inappropriate monument under the new conditions, it is to be hoped that it will never be reërected, except perhaps at the entrance to some cemetery. The new entrance to the Chestnut-Hill Reservoir Drive, which is on the brink of a deep slope towards the reservoir, would be better marked by some simpler device of stone posts and shrubbery.

On the grounds of the Lawrence Basin a new connection with the Boulevard has been made and the old driveway to South street abandoned.

Four wells have been sunk on the grounds at this reservoir for use in the summer months, and the public have appreciated them highly.

BROOKLINE RESERVOIR.

H. W., 125.00; Area, 23 acres; Greatest Depth, 24 feet; Contents, 119,533,960 gals.

Everything in connection with this reservoir is in good condition. No other work than maintenance has been done at this point during the year.

FISHER-HILL RESERVOIR.

H. W., 241.00; Pipe Inverts, 220.00; Depth, 21 feet; Contents, 15,400,000 gals. above 223.00.

This high-service reservoir is in good condition. It has been maintained by the Chestnut-Hill Reservoir force.

INSPECTION OF WATER SOURCES.

The following is a digest of the report of Mr. J. S. Con-cannon, Chief Inspector :

Total number of cases inspected	668
Old cases	637
New cases	31

Present condition of all cases :

Remedied	156
Present safe	405
Seem safe	42
Suspected	20
Unsatisfactory	45
Legal notices	14

No legal injunctions were necessary during the year.

BIOLOGICAL LABORATORY.

During the year 1895 2,044 microscopical examinations of water and 1,217 cultures of bacteria were made at the laboratory.

Some of the special subjects investigated during the year were :

The circulation of water in an ice-covered reservoir as shown by color and temperature observations.

Comparisons of the effect of storage in Basins 4 and 6.

Temperature of the water at various depths in Lake Winni-piseogee and other frozen lakes.

Continued investigation of stagnation phenomena, with an extensive series of thermophone observations.

Continued investigation of the cause of the seasonal distribution of micro-organisms.

New method of collecting samples for bacteriological examination.

The seasonal changes in the color of streams.

Use of aspirator in connection with the Sedgwick-Rafter method of water examination.

The following report of experiments made in the labora-tory has been prepared by Mr. G. C. Whipple.

Studies made in the laboratory previous to 1894 estab-

lished the following facts in regard to the growth of diatoms in surface-waters :

In deep ponds there are two well-marked seasons of growth, one in the spring and one in the fall. These periods of growth follow the periods of stagnation, due to the thermal stratification of the water, and are coincident with the seasons when the water is in complete vertical circulation. In shallow ponds, where the phenomena of stagnation and circulation are somewhat different, there is usually a regular recurring spring growth, and occasional growths in the summer and autumn. The explanation heretofore offered for this peculiar seasonal distribution was based chiefly upon food-supply. In a former report,¹ it was shown that diatoms require a sufficient supply of nitrogen as nitrates and a free circulation of air; and that during the periods of circulation this food-supply is abundant.

More extended observations and experiments, however, seem to indicate that the food-supply theory, taken by itself, is inadequate to explain all the phenomena: and while it is true that the question of food is one of fundamental importance, yet there are other factors which materially influence the growth. Of these factors *light* is perhaps the most important.

Diatoms, in common with all chlorophyllaceous plants, require a certain amount of light for their proper development. They will not grow in the dark, although they will there preserve their vitality for a long time. Exposure to bright sunlight, on the other hand, is usually fatal. The amount of light most favorable to their growth must, of course, lie between these two limits, and it will be seen that here lies a wide field for experiment. With a view to determining the relation between the intensity of light and the corresponding growth of diatoms several series of experiments have been made in the laboratory, the results of which are here described.

Preliminary experiments showed that, on account of the extreme sensitiveness of diatoms to external influences, cultures made in the laboratory would have little comparative value, and it was also found to be a very difficult matter to control properly the intensity of the light. It was therefore decided to make the experiments in the reservoirs under conditions as nearly as possible like those found in nature.

The method employed was an extremely simple one. It consisted of suspending bottles, filled with water from the same source, at different depths in the reservoir, the bottles

¹ Nineteenth Annual Report of the Boston Water Board for the year ending January 31, 1895.

being tied to a rope suspended from a buoy. After certain intervals of time the bottles were drawn to the surface and the water examined, records being kept of the number of diatoms in each sample both before and after exposure. The bottles varied in capacity from 150 to 1,000 cubic centimeters. In the early experiments they were tightly stoppered, but in the later ones cloth was tied over the mouths of the bottles, and above these inverted tumblers were secured. The latter arrangement was found to give heavier growths on account of providing better opportunities for the circulation of air and for the renewal of food-supply.

The practical question to be decided by the experiments was not the exact amount of light necessary for the development of diatoms, but the variations in their growth at different depths due to the intensity of light.

The subject of the penetration of light into bodies of water has not been as thoroughly investigated as its importance appears to demand. Forel and others have studied the transparency of the water in some of the Swiss lakes, and similar studies have been made upon the water of the ocean. In most cases the experiments consisted simply of the determination of the limit of visibility of a white disc or incandescent light lowered into the water, the results being valuable only for comparing the relative transparency of different waters, or of the same water at different times. In a few instances photographic methods have been used, and the results show approximately the relative intensity of light at different depths. All the observations, however, have been made on waters which were almost colorless, and the results are of little value when applied to the brown-colored waters of many of our New England ponds. For example, Forel found that in Lake Geneva a white disc 20 cm. in diameter was visible at a depth of 70 feet. A similar disc lowered in Chestnut-Hill Reservoir at a time when the color was 0.92 (Platinum Scale) disappeared from view at a depth of 6 feet.

The decrease in intensity of light below the surface is due to two causes: first, the absorption of a certain portion of light by the water; and, second, the presence of fine particles in suspension which act as a screen to shut out the light. The coefficient of absorption of light by water varies greatly with the quality of the water, its temperature, etc. Theoretically, the reduction of light passing through water follows the law that as the depth increases arithmetically the intensity of the light decreases geometrically. For example, if the intensity of the light falling upon the surface of a pond is 1, and if $\frac{1}{4}$ of the light is absorbed by the first foot of

water, then the intensity of the light at a depth of one foot will be $\frac{3}{4}$. The second foot of water will absorb $\frac{1}{4}$ of $\frac{3}{4}$, and the intensity of light at a depth of two feet will be $\frac{9}{16}$, and so on. At this rate of decrease, the intensity of light at a depth of ten feet will be only 5 per cent. of that of the surface. Not only does the intensity of the light vary at different depths, but its quality also varies. The red and yellow rays are said to be most readily transmitted. Several series of observations on the growth of diatoms at different depths are given in the tables printed below. In experiment No. 1, which may be considered as typical of the general results obtained, bottles were filled with water from Lake Cochituate and placed in Chestnut-Hill Reservoir at depths of 2, 4, 6, 8, 10, and 25 feet, where they remained from April 29 to May 13. During this time the temperature varied from 53° to 62° , and the color of the water in which they were immersed averaged 0.58. The relative growths at the different depths will be readily seen from the table. Near the surface, there was a vigorous growth of several genera, *Synedra*, however, being by far the most abundant. At greater depths the total numbers were less. At the bottom, there were fewer than in the original sample. In experiment No. 3, the surface sample was so placed that at times it was partially above the water and consequently exposed to the varying atmospheric temperature, and occasionally to direct sunlight. The effect was seen in a diminished growth. In most of the experiments the "surface" samples were immersed about six inches.

One of the most interesting features of the experiments was the determination of the depth below which the diatoms would not grow. This, as would naturally be expected, was found to vary with the character of the water, — its color, turbidity, etc. For example, two series of observations (Experiments Nos. 5 and 6) were made upon water from the same source, one series of bottles being located in the white water of Lake Cochituate, and the other in the darker water of the Chestnut-Hill Reservoir. The time of growth was the same for both. The results showed that in Lake Cochituate the limit of growth was about twelve feet, while in the Chestnut-Hill Reservoir it was about six feet. That the limit of growth depends to a large extent upon the color of the water may be seen from the following table, which shows the average limit of growth for three groups of observations arranged according to the color of the water :

Table showing the Relation between the Limit of Diatom Growth and the Color of the Water.

Group.	Number of Observations.	Average Color (Platinum Standard).	Average Limit of Growth, Depth in Feet.
No. 1.	5	0.29	15
No. 2.	5	0.60	12
No. 3.	2	0.86	8

Thus, in dark waters the limit of growth is only about 8 feet, while in the light-colored waters it is 15 feet. The depth at which diatoms will grow in perfectly colorless waters is unknown, but the experiments of Forel indicate that the limit of growth might be found at a considerable depth. In ground waters (practically colorless) stored in comparatively deep open reservoirs diatoms have often been found growing upon the bottom.

In order to appreciate better the fact that the luxuriance of diatom growths depends upon the intensity of light, diagrams have been drawn showing the average growth at different depths, and the intensity of light calculated for each depth according to the above-mentioned law, using a coefficient of absorption approximately determined by laboratory experiment. The parallelism between the two curves was very striking.

Diatoms are said to be positively heliotropic, that is, they tend to move towards the light. In some genera this power is strong, but in most it is comparatively weak. Our experiments have shown that all of the common diatoms found in water-supplies sink rapidly in quiet water, and are of their own accord unable to rise towards the light through any great distance. Very slight convection currents, however, serve to overcome the effect of gravity and keep them near the surface.

The bearing which these facts have upon the seasonal distribution of diatoms is obvious, and we are now better able to understand why it is that their growths occur during those seasons of the year when the water is in circulation. During those periods not only is food more abundant, but the vertical currents keep the diatoms near the surface where there is light enough to stimulate their growth, and where there is an abundant supply of air. If this theory be true it must follow that the weather has a marked influence on their growth. We should expect the greatest growths to occur on warm fair days when there is just wind enough to keep the diatoms

near the surface. On quiet days we should expect the diatoms to sink in the water, — perhaps below the limit of their growth. During a long period of quiet weather they might even sink in a deep pond to such a depth that the circulation induced by the wave action would not be able to bring them again to the surface.

This was exactly what took place in Lake Cochituate in the spring of 1895. In this lake there is almost invariably a heavy spring growth of diatoms, but in 1895 the growth was small. It began as usual, the diatoms being apparently in good condition. Early in May, however, there were several days of uncommonly warm weather. The temperature of the air went above 90°, and the temperature of the water at the surface one day reached 76° F. For almost a week the water was perfectly calm. During this calm weather the diatoms settled rapidly, disappearing almost entirely from the surface. Meanwhile the water was becoming stratified on account of the high surface temperature, and when once more the wind began to blow, its influence was felt only to a depth of ten or fifteen feet. The diatoms, however, having settled below that depth, were unable to rise, and consequently their growth ceased.

In Basin 3, which is not nearly as deep as Lake Cochituate, the growth of diatoms was arrested during the same warm quiet period, but inasmuch as circulation afterwards extended to the bottom, the growth began again and continued until the next warm quiet period, which occurred in June, checked it.

In this connection it will be recalled that when the ice forms over a pond the diatoms growths usually cease.

Since diatoms are dependent upon light, and since light penetrates to greater depths in light than in dark waters, we should expect to find heavy growths most common in ponds where the water has a low color. An examination of the analyses of the Massachusetts State Board of Health shows that in a general way this is true.

Experiment No. 1.*Cochituate Water in Chestnut-Hill Reservoir, April 29 to May 13, 1895.*

Temperature, 53° to 62°.

Color, 0.58.

DATE.	Depth.	NUMBER PER CUBIC CENTIMETER.					
		Asterionella.	Melosira.	Stephanodiscus.	Synedra.	Tabellaria.	Total.
April 29 . .	*	94	196	3	11	15	319
May 13 . . .	2 ft.	4,040	910	20	22,010	550	27,530
" . . .	4 "	570	80	10	6,800	120	7,580
" . . .	6 "	380	650	26	4,510	284	5,850
" . . .	8 "	650	840	10	1,304	100	2,920
" . . .	10 "	154	1,380	26	80	0	1,624
" . . .	25 "	16	132	0	88	28	264

* Representative sample of the water before exposure.

Experiment No. 2.*Cochituate Water in Chestnut-Hill Reservoir, May 15 to June 3, 1895.*

Temperature, 62° to 68°.

Color, 0.57.

DATE.	Depth.	NUMBER PER CUBIC CENTIMETER.					
		Asterionella.	Melosira.	Stephanodiscus.	Synedra.	Tabellaria.	Total.
May 15 . . .	*	61	29	12	17	10	129
May 20 . . .	Surface,	196	28	12	896	104	1,236
" . . .	2 ft. . .	108	32	20	1,408	56	1,624
" . . .	4 " . .	116	56	36	584	80	872
" . . .	6 " . .	88	20	32	288	28	456
" . . .	8 " . .	56	8	24	136	24	248
" . . .	10 " . .	0	0	36	220	8	264
" . . .	15 " . .	48	24	8	192	28	300
" . . .	20 " . .	16	16	32	204	16	284
" . . .	25 " . .	80	36	20	104	0	240
May 23 . . .	Surface,	140	0	40	9,340	80	9,600
" . . .	2 ft. . .	80	0	80	6,870	0	7,030
" . . .	4 " . .	572	76	48	3,464	204	4,364
" . . .	6 " . .	176	36	60	1,020	104	1,396
" . . .	8 " . .	256	76	48	500	68	948
" . . .	10 " . .	56	56	16	904	24	1,056

* Representative sample of the water before exposure.

Experiment No. 2. — *Concluded.*

DATE.	Depth.	NUMBER PER CUBIC CENTIMETER.					
		Asterio- nella.	Melosira.	Stephano- discus.	Synedra.	Tabellaria.	Total.
May 23 . . .	15 ft. . .	60	16	20	376	56	528
" . . .	20 " . .	20	0	0	400	0	420
" . . .	25 " . .	12	20	24	152	8	216
May 27 . . .	Surface,	200	0	60	18,800	40	19,100
" . . .	2 ft. . .	0	0	0	10,100	80	10,180
" . . .	4 " . .	140	100	60	21,550	290	22,140
" . . .	6 " . .	70	50	90	4,580	90	4,880
" . . .	8 " . .	188	56	40	1,184	160	1,628
" . . .	10 " . .	60	92	80	1,256	64	1,480
" . . .	15 " . .	104	56	16	316	16	508
" . . .	20 " . .	40	32	16	404	0	492
" . . .	25 " . .	0	16	20	96	16	148
June 3 . . .	Surface,	. . .	. . .	. . .	. . .	. . .	. . .
" . . .	2 ft. . .	170	0	0	28,050	40	28,260
" . . .	4 " . .	0	0	0	88,600	40	88,640
" . . .	6 " . .	0	0	20	15,850	110	15,980
" . . .	8 " . .	160	0	30	14,250	170	14,630
" . . .	10 " . .	80	120	50	5,140	0	5,390
" . . .	15 " . .	80	20	10	1,830	0	1,940
" . . .	20 " . .	60	80	20	950	10	1,120
" . . .	25 " . .	50	20	20	70	70	230

Experiment No. 3.*Cochituate Water in Lake Cochituate, May 31 to June 7, 1895.*

Temperature, 64° to 70°.

Color, 0.29.

DATE.	Depth.	NUMBER PER CUBIC CENTIMETER.					
		Asterionella.	Melosira.	Stephanodiscus.	Synedra.	Tabellaria.	Total.
May 31 . . .	*	31	62	2	2	7	104
June 7 . . .	Surface,	350	0	70	380	0	800
" . . .	2½ ft.,	120	40	80	11,100	50	11,390
" . . .	5 "	310	0	40	2,030	160	2,540
" . . .	10 "	32	0	8	44	28	112
" . . .	15 "	20	0	8	24	8	60
" . . .	20 "	48	12	8	12	4	84
" . . .	25 "	24	0	8	32	12	76
" . . .	30 "	24	48	8	4	16	100
" . . .	40 "	56	16	28	4	40	144
" . . .	50 "	40	48	12	20	28	148
" . . .	60 "	12	56	12	44	40	164

* Representative sample of the water before exposure.

Experiment No. 4.*Cochituate Water in Chestnut-Hill Reservoir, July 11 to July 26, 1895.*

Temperature, 69° to 77°.

Color, 0.53.

DATE.	Depth.	NUMBER PER CUBIC CENTIMETER.					
		Asterionella.	Melosira.	Stephanodiscus.	Synedra.	Tabellaria.	Total.
July 11 . . .	*	2	30	8	4	0	44
July 26 . . .	Surface,	0	0	0	328	0	328
" . . .	2½ ft.,	0	32	0	8	0	40
" . . .	5 "	0	0	0	4,400	0	4,400
" . . .	7½ "	0	0	0	1,472	0	1,472
" . . .	10 "	0	0	0	140	56	196
" . . .	12½ "	0	72	0	32	12	116
" . . .	15 "	0	60	0	48	68	176
" . . .	17½ "	0	0	0	32	24	56
" . . .	20 "	0	24	0	8	0	32
" . . .	25 "	0	0	0	12	4	16

* Representative sample of the water before exposure.

Experiment No. 5.

Cochituate Water in Lake Cochituate and Chestnut-Hill Reservoir, November 22 to November 29, 1895.

Temperature, 42° to 46°.

Color, { Lake Cochituate, 0.33.
 { C.H. Reservoir, 0.90.

DATE.	Depth.	NUMBER PER CUBIC CENTIMETER.					
		Asterionella.	Melosira.	Stephanodiscus.	Synedra.	Tabellaria.	Total.
Nov. 22 . .	*	824	244	8	24	8	1,108

In Lake Cochituate.

Nov. 29 . . .	Surface,	2,820	675	20	0	0	3,515
" . . .	2½ ft.	2,540	285	10	0	10	2,845
" . . .	5 "	2,180	290	10	0	50	2,530
" . . .	7½ "	1,485	495	5	50	5	2,040
" . . .	10 "	840	110	0	0	0	950
" . . .	15 "	290	205	15	0	0	510
" . . .	30 "	520	360	10	40	20	950
" . . .	50 "	285	520	10	0	15	830

In Chestnut-Hill Reservoir.

Nov. 29 . . .	Surface,	.....	.....	.....	.....	.....	.....
" . . .	2½ ft.	1,070	125	10	0	10	1,215
" . . .	5 "	770	230	5	0	20	1,025
" . . .	7½ "	840	310	5	0	0	1,155
" . . .	10 "	485	140	10	0	0	635
" . . .	15 "	470	145	25	0	0	640

* Representative sample of the water before exposure.

Experiment No. 6.

Cochituate Water in Lake Cochituate and Chestnut-Hill Reservoir, November 29 to December 9, 1895.

Temperature, 40° to 44°.

Color { Lake Cochituate, 0.33.
C.H. Reservoir, 0.84.

DATE.	Depth.	NUMBER PER CUBIC CENTIMETER.					
		Asterio- oella.	Melosira.	Stephano- discus.	Synedra.	Tabellaria.	Total.
Nov. 29 . . .	*	625	150	13	17	0	810

In Lake Cochituate.

Dec. 9 . . .	Surface,	3,010	685	35	60	0	3,790
" . . .	2½ ft. .	1,570	505	25	0	0	2,100
" . . .	5 " .	1,240	240	40	20	0	1,540
" . . .	10 " .	990	270	0	0	0	1,260
" . . .	15 " .	865	260	15	0	20	1,160
" . . .	20 " .	680	230	15	0	30	955

In Chestnut-Hill Reservoir.

Dec. 9 . . .	Surface,	895	435	40	60	50	1,480
" . . .	2½ ft. .	1,125	265	20	0	10	1,420
" . . .	5 " .	965	260	30	0	0	1,255
" . . .	10 " .	510	170	55	10	0	745
" . . .	15 " .	110	430	20	60	55	675
" . . .	20 " .	.....	.....	.....	.....	.....	.....

* Representative sample of the water before exposure.

QUALITY OF WATER.

Owing to the stirring up of a large extent of country above Basin 3 due to the stripping in Basin 5, it has been very difficult to maintain the usual standard of quality in the Boston water, but there has been no complaint.

The following tables give first the average condition of the chemical analyses of the tap water as made under the direction of the State Board of Health, and second the averages of monthly analyses of the sources of supply; then follow biological tables, which are the result of the work in the laboratory at Chestnut-Hill Reservoir. Following these tables are the usual tables of detailed expenditures and rainfall.

Very truly yours,

DESMOND FITZGERALD,
Resident Engineer and Gen. Supt.

Averages of Monthly Analyses, January 1 to December 31, 1895.

PARTS IN 100,000. (STATE BOARD OF HEALTH.)

LOCALITY.	Color.	RESIDUE ON EVAPORATION.			Chlorine.	NITROGEN.					Oxygen Consumed.	Hardness.	REMARKS.
		Total.	Loss on Ignition.			Albuminoid Ammonia.		Free Ammonia.	As Nitrates.	As Nitrites.			
			Fixed.	Unfiltered.		Filtered.							
Reservoir No. 2, influent	1.07	4.71	2.20	2.51	.36	.0301	.0276	.0014	.0001	.0086	.9939	1.1	Surface means 1 foot below surface.
Reservoir No. 2, near outlet	1.03	4.65	2.05	2.60	.34	.0244	.0211	.0015	.0001	.0090	.9837	1.2	
Reservoir No. 3, influent	1.03	6.55	2.30	4.25	.49	.0310	.0286	.0041	.0003	.0196	.9781	2.0	
Reservoir No. 3, near outlet	0.86	5.43	2.22	3.21	.41	.0273	.0231	.0027	.0001	.0151	.8440	1.8	
Reservoir No. 4, influent	1.19	4.70	2.45	2.25	.32	.0285	.0261	.0006	.0000	.0034	1.1584	1.2	
Reservoir No. 4, near outlet	0.89	4.22	2.04	2.18	.32	.0246	.0223	.0015	.0000	.0052	.9047	1.1	
Reservoir No. 6, influent	1.66	6.02	3.17	2.85	.55	.0351	.0319	.0009	.0000	.0029	1.7360	1.5	
Reservoir No. 6, near outlet, surface	0.81	4.33	1.99	2.34	.40	.0247	.0219	.0015	.0000	.0048	.8857	1.3	
Reservoir No. 6, " " bottom	0.75	4.33	1.94	2.39	.41	.0204	.0181	.0036	.0001	.0064	.7656	1.3	
Lake Cochituate, gate-house	0.25	5.08	1.68	3.40	.51	.0178	.0163	.0015	.0001	.0112	.4208	2.1	
Service-pipe, Mass. Inst. Tech., Boston	10.72	4.90	2.02	2.88	.40	.0197	.0175	.0006	.0001	.0171	.6897	1.7	
Mystic Lake	0.15	16.07	2.96	13.11	3.25	.0271	.0197	.0550	.0016	.0585	.3228	5.4		Mystic Supply.

1 = 0.59 Boston Water-Works Standard (Platinum-Cobalt).

Surface means 1 foot below surface.

Mystic Supply.

Average Condition of Tap Water, Boston, 1895. (State Board of Health.)

PARTS IN 100,000.

LOCALITY.	Color.	RESIDUE ON EVAPORATION.			Chlorine.	NITROGEN.						Oxygen Consumed.	Hardness.	REMARKS.
		Total.	Loss on Ignition.	Fixed.		Albuminoid Ammonia.		Free Ammonia.	As Nitrites.	As Nitrates.				
						Unfiltered.	Filtered.							
Service-pipe, Mass. Inst. of Technology . . .	1 0.72	4.90	2.02	2.88	.40	.019	.0175	.0006	.0001	.0171	.6897	1.7	{ Averages of monthly analyses.	

1 = 0.50 Boston Water Works Standard (Platinum-Cobalt).

Lake Cochituate, 1895.

MONTH.	ORGANISMS. ¹				AMORPHOUS. ¹				REMARKS.
	Sur.	Mid.	Bot.	Mean.	Sur.	Mid.	Bot.	Mean.	
January	255	407	422	361	184	174	343	234	Diatomaceæ.
February	34	21	232	96	111	155	739	335	
March	10	23	55	29	187	157	450	265	
April	97	109	101	102	507	286	703	499	Diatomaceæ.
May	188	149	133	157	204	393	832	476	Diatomaceæ.
June	437	188	185	271	144	138	678	320	{ Chlorophyceæ. { Diatomaceæ. { Cyanophyceæ.
July	480	539	503	507	365	346	3,400	1,370	{ Cyanophyceæ. { Chlorophyceæ. { Cyanophyceæ.
August	248	329	290	289	128	396	2,181	902	{ Chlorophyceæ. { Chlorophyceæ. { Chlorophyceæ.
September	137	193	53	128	129	387	2,273	930	{ Cyanophyceæ. { Cyanophyceæ. { Cyanophyceæ.
October	450	400	252	367	252	247	1,928	809	{ Diatomaceæ. { Cyanophyceæ. { Diatomaceæ.
November	1,159	1,169	1,198	1,185	353	333	752	479	{ Cyanophyceæ. { Diatomaceæ. { Infusoria.
December	762	921	808	830	203	197	222	207	{ Diatomaceæ. { Cyanophyceæ.
Mean	355	373	353	360	230	268	1,208	569	

¹ Standard units per c.c.

Basin 2, 1895.

MONTH.	ORGANISMS. ¹					AMORPHOUS. ¹					REMARKS.
	Sur.	Mid.	Bot.	Mean.	Influent.	Sur.	Mid.	Bot.	Mean.	Influent.	
January	6	6	4	5	4	142	135	158	145	206	
February	8	7	7	7	6	123	118	127	123	151	
March	6	18	17	14	29	181	169	186	179	126	Diatomaceæ present from May to October.
April	49	25	22	32	46	167	186	170	174	200	
May	56	59	47	54	35	507	685	1,065	736	363	Chlorophyceæ present from June to October.
June	109	76	63	83	91	221	297	849	458	297	Cyanophyceæ present in July and August.
July	168	195	160	173	38	514	567	776	619	310	
August	152	108	88	116	41	445	440	625	503	147	Infusoria present in small numbers from March to December.
September	82	93	74	83	21	311	330	529	390	188	
October	72	53	49	58	32	630	596	659	628	449	
November	15	14	22	17	19	375	482	412	423	207	
December	18	17	9	15	21	102	110	131	115	124	
Mean	61	56	47	55	32	310	339	474	374	231	

¹ Standard units per c.c.

Basin 3, 1895.

MONTH.	ORGANISMS. ¹					AMORPHOUS. ¹					REMARKS.
	Sur.	Mid.	Bot.	Mean.	Influent.	Sur.	Mid.	Bot.	Mean.	Influent.	
January.	13	18	47	26	19	101	104	106	104	208	Diatomaceæ were abundant in June, July, and October. Chlorophyceæ present in July and October. Cyanophyceæ very abundant from June to November, especially in August and September, when <i>Celosphaerium</i> and <i>Anabaena</i> predominated. Infusoria present from April to October.
February	3	1	4	3	16	82	81	105	89	106	
March.	14	14	13	14	24	158	178	232	189	259	
April	62	46	57	55	42	449	252	250	317	363	
May.	375	260	235	290	49	635	539	1,303	826	453	
June	787	768	597	697	114	167	158	443	256	584	
July	1,197	1,072	633	967	100	534	606	2,546	1,229	1,912	
August	1,675	1,134	1,146	1,318	146	268	339	434	347	401	
September	1,778	1,313	1,487	1,693	29	446	380	519	448	508	
October	1,227	1,161	1,342	1,243	38	591	678	662	644	391	
November.	266	253	222	247	7	624	960	938	841	253	
December.	53	34	37	41	3	325	293	276	298	273	
Mean	621	543	485	550	49	365	381	651	466	481	

¹ Standard units per c.c.

Basin 4, 1895.

MONTH.	ORGANISMS. ¹					AMORPHOUS. ¹					REMARKS.
	Sur.	Mid.	Bot.	Mean.	Influent.	Sur.	Mid.	Bot.	Mean.	Influent.	
January	78	18	13	36	28	99	185	168	151	85	Diatonaceæ present from May to August, and from October to December.
February	74	19	19	37	3	66	130	170	122	68	
March	10	5	18	11	31	77	82	138	99	55	
April	27	15	12	18	7	103	77	72	84	68	Chlorophyceæ were occasionally observed during the summer.
May	79	37	21	46	31	201	147	151	166	131	
June	76	47	41	55	35	135	118	146	133	103	Cyanophyceæ absent.
July	123	43	48	71	28	162	177	150	163	157	
August	75	78	38	64	24	133	146	182	154	110	Infusoria present in January, February, and from July to September.
September	30	29	7	22	30	160	173	164	166	134	
October	45	55	33	44	14	401	381	327	370	153	
November	40	37	21	33	8	188	218	155	187	82	
December	22	19	26	22	1	100	99	93	97	63	
Mean	57	35	25	39	20	152	161	160	158	101	

¹ Standard units per c.c.

Basin 6, 1895.

MONTH.	ORGANISMS. ¹					ANORPHOUS. ¹					REMARKS.
	Sur.	Mid.	Bot.	Mean.	Influent.	Sur.	Mid.	Bot.	Mean.	Influent.	
January	41	28	4	24	9	228	127	240	198	89	Diatomaceæ present from May to October.
February	50	10	5	22	2	102	128	184	138	91	
March	36	4	21	20	1	125	153	229	169	68	
April	64	57	76	66	6	107	105	129	114	62	Chlorophyceæ abundant in September and October.
May	91	42	51	61	44	343	338	447	376	139	
June	193	61	39	98	101	228	236	284	249	112	
July	203	46	18	89	27	233	220	861	438	168	Cyanophyceæ absent.
August	91	65	47	68	15	217	285	329	277	132	
September	243	130	83	152	7	215	256	387	286	145	
October	186	190	214	197	37	299	298	336	311	179	Infusoria present from January to June, and from September to November.
November	41	56	60	52	4	139	143	147	143	66	
December	13	9	16	13	2	100	104	112	109	44	
Mean	104	58	53	72	21	194	199	307	234	108	

¹ Standard units per c.c.

MONTH.	CHESTNUT-HILL RESERVOIR.						BROOKLINE GATE-HOUSE.		TAPS IN THE CITY.		
	Organisms. ¹			Amorphous. ¹			Organisms. ¹	Amorphous. ¹	Park Sq.	Mattapan.	Amorphous. ¹
	Sudbury.	Cochituate.	Effluent.	Sudbury.	Cochituate.	Effluent.					
January	27	263	74	103	189	142	180	149	79	78	80
February	17	44	35	115	145	117	21	102	14	6	74
March	12	9	15	167	200	176	30	175	12	5	61
April	38	60	52	192	225	194	62	196	38	26	82
May	139	128	57	466	238	209	76	195	93	42	113
June	386	295	307	373	157	205	329	178	233	111	98
July	186	378	494	528	243	360	350	400	373	155	154
August	100	307	310	561	333	312	269	280	188	47	98
September	73	135	179	478	96	247	116	243	142	19	95
October	237	419	286	454	186	209	279	205	258	63	103
November	88	1,090	208	270	229	134	297	150	138	42	88
December	16	663	114	124	190	149	210	133	140	50	67
Mean	112	316	178	319	203	205	185	200	142	54	93

¹ Standard units per c.c.

Temperature (Fahrenheit), 1895.

MONTH.	LAKE COCHITUATE. ¹			BASIN 2.			BASIN 3.			BASIN 4. ¹			BASIN 6. ¹		
	Sur.	Mid.	Bot.	Sur.	Mid.	Bot.	Sur.	Mid.	Bot.	Sur.	Mid.	Bot.	Sur.	Mid.	Bot.
January	36.4	38.4	39.0	33.3	34.0	34.7	33.7	35.4	36.2	33.9	35.8	36.9	34.3	36.8	39.8
February	33.4	37.7	38.9	33.3	34.2	35.4	33.5	35.6	37.8	32.9	36.5	38.7	32.8	38.0	40.0
March	34.8	38.4	39.7	33.1	34.2	35.8	33.2	34.6	37.6	32.9	35.8	38.7	34.7	39.0	40.0
April	41.3	41.6	40.4	41.3	42.2	43.0	41.5	41.5	42.1	41.5	41.1	41.3	41.5	40.8	39.7
May	60.1	44.6	42.1	62.4	60.4	59.2	61.6	59.6	57.9	58.2	50.6	46.5	57.0	49.9	48.5
June	74.0	44.5	42.2	76.6	70.8	66.9	74.2	71.6	65.5	72.1	54.9	46.3	73.1	51.6	47.6
July	74.9	44.7	42.2	73.0	72.1	67.8	73.5	70.2	67.9	71.9	54.3	46.4	74.3	52.2	47.9
August	76.0	44.9	42.2	74.0	73.1	70.1	74.4	73.5	71.5	74.0	53.6	47.3	74.5	67.1	53.9
September	69.4	45.6	42.6	72.1	71.1	69.3	71.8	70.8	68.3	69.9	54.8	47.6	71.5	68.7	62.0
October	56.5	49.3	43.4	54.5	54.5	54.5	55.6	55.6	55.9	56.4	54.1	50.3	58.2	56.5	56.0
November	46.5	46.0	44.0	44.2	43.9	44.3	44.6	44.4	44.0	45.2	45.3	45.4	45.7	45.7	45.6
December	38.3	38.5	38.6	36.1	36.9	37.5	36.0	36.9	37.7	36.9	37.9	38.0	37.2	38.1	38.7
Mean	53.5	42.9	41.2	52.8	52.3	51.5	52.8	52.5	51.9	52.2	46.2	43.6	52.9	48.7	46.6

¹ Temperature observations taken with the thermophone.

Temperatures (Fahrenheit), 1895.

MONTH.	CHESTNUT-HILL RESERVOIR GATE-HOUSES.			CHESTNUT-HILL RESERVOIR. ¹			BROOK- LINE.	TAPS.	
	Sudbury.	Cochituate.	Effluent.	Surface.	Middle.	Bottom.	Gate-House.	Park Sq.	Mattapan.
January	36.5	37.7	36.3	. . .	. . .	. . .	37.0	37.6	40.3
February	35.3	37.6	35.5	32.3	34.8	36.2	36.0	36.9	38.9
March	36.8	37.4	36.6	. . .	. . .	. . .	36.9	38.0	36.6
April	42.5	41.0	42.3	42.3	41.8	40.6	42.8	43.2	40.1
May	58.4	57.7	57.8	59.6	57.8	48.7	57.6	57.5	49.9
June	69.0	69.3	67.7	72.7	67.5	49.4	69.1	66.7	59.1
July	70.5	71.1	70.5	73.6	69.6	50.4	71.2	69.2	63.2
August	72.2	73.0	72.3	74.7	71.1	51.4	73.0	70.4	63.7
September	69.1	69.7	70.2	70.7	67.9	52.1	69.6	69.3	64.3
October	56.3	57.3	57.9	54.2	53.9	52.4	57.2	57.8	56.6
November	46.1	48.2	46.7	44.1	43.6	43.5	46.6	48.4	51.1
December	37.9	39.8	38.3	. . .	. . .	. . .	38.4	39.6	43.9
Mean	52.6	53.3	52.7	. . .	. . .	. . .	52.9	52.9	50.6

¹Temperature observations taken with the thermophone.

Colors, 1895. (Platinum Standard.)

MONTH.	Lake Cochituate.					Basin 2.					Basin 3.					Basin 4.					Basin 6.				
	Sur.	Mid.	Bot.	Mean.	Influent.	Sur.	Mid.	Bot.	Mean.	Influent.	Sur.	Mid.	Bot.	Mean.	Influent.	Sur.	Mid.	Bot.	Mean.	Influent.	Sur.	Mid.	Bot.	Mean.	Influent.
January . . . . .	.30	.31	.38	.33	.73	.89	.91	.93	.91	1.06	.90	.84	.85	.86	.82	.86	.77	.78	.80	1.08	.60	.60	.58	.59	1.43
February . . . . .	.29	.27	.48	.35	.85	1.01	1.01	.99	1.00	1.05	.84	.83	.87	.85	.99	1.03	.74	.70	.82	1.11	.64	.63	.64	.64	1.70
March . . . . .	.34	.29	.47	.37	.77	.73	.71	.77	.74	.74	.72	.78	.81	.77	.78	.81	.75	.69	.75	.92	.80	.69	.77	.75	1.04
April . . . . .	.35	.32	.36	.34	.92	.72	.74	.75	.74	.83	.75	.75	.76	.75	.96	.79	.79	.75	.78	1.00	.75	.75	.74	.75	1.20
May . . . . .	.31	.32	.37	.33	.99	.87	.88	.90	.88	1.13	.81	.82	.89	.84	1.37	.82	.82	.80	.81	1.53	.79	.78	.77	.78	1.88
June . . . . .	.33	.30	.53	.39	.85	.89	.93	1.13	.98	1.20	.84	.88	1.05	.92	1.36	.83	.83	.77	.81	1.12	.70	.69	.73	.71	1.99
July . . . . .	.30	.31	.71	.44	.67	.97	.96	1.02	.98	.93	.75	.78	1.09	.87	1.03	.73	.76	.77	.75	.92	.58	.67	.71	.65	1.49
August . . . . .	.24	.31	.74	.43	.81	.70	.72	.83	.75	.87	.63	.65	.65	.64	1.02	.63	.67	.70	.67	.93	.49	.57	.72	.59	2.10
September . . . . .	.21	.29	1.40	.63	.37	.66	.66	.74	.69	.70	.57	.57	.61	.58	.82	.55	.61	.62	.59	.51	.47	.48	.64	.53	1.32
October . . . . .	.21	.23	1.46	.63	.85	1.01	1.02	1.02	1.02	1.11	.72	.74	.74	.73	1.17	.62	.62	.66	.63	1.47	.60	.59	.61	.60	1.56
November . . . . .	.31	.32	1.08	.57	.86	1.28	1.34	1.30	1.31	1.24	1.24	1.20	1.26	1.23	1.34	.86	.87	.87	.87	1.51	.92	.93	.94	.93	1.58
December . . . . .	.32	.32	.33	.32	.72	.77	.83	.82	.81	.75	1.06	1.01	.99	1.02	.93	.97	.97	.97	.97	1.21	.96	.96	.97	.96	1.13
Mean . . . . .	.29	.30	.69	.43	.78	.88	.89	.93	.90	.97	.82	.82	.88	.84	1.05	.79	.77	.76	.77	1.11	.69	.70	.74	.71	1.54

Colors, 1895 (Platinum Standard).

MONTH.	CHESTNUT-HILL RESERVOIR GATE-HOUSES.			CHESTNUT-HILL RESERVOIR.			BROOK- LINE.	TAPS.	
	Sudbury.	Cochituate.	Effluent.	Surface.	Middle.	Bottom.	Gate-House.	Park Sq.	Matapan.
January . . . . .	.84	.30	.76	. . .	. . .	. . .	.59	.74	.61
February . . . . .	.82	.30	.72	.73	.72	.72	.58	.71	.63
March . . . . .	.75	.35	.71	. . .	. . .	. . .	.59	.69	.61
April . . . . .	.72	.36	.58	.57	.58	.58	.51	.56	.47
May . . . . .	.81	.32	.58	.57	.57	.57	.50	.56	.49
June . . . . .	.87	.33	.60	.61	.61	¹ .57	.56	.61	.54
July . . . . .	.89	.29	.62	.62	.62	¹ .57	.58	.64	.58
August . . . . .	.71	.24	.56	.56	.56	¹ .57	.51	.53	.46
September . . . . .	.70	.22	.51	.51	.52	1.74	.45	.50	.43
October . . . . .	.91	.21	.52	.52	.53	.55	.48	.53	.41
November	1.24	.29	.83	.86	.85	.82	.77	.81	.65
December . . . . .	.90	.31	.77	. . .	. . .	. . .	.65	.77	.62
Mean . . . . .	.85	.29	.65	2.61	2.62	2.75	.56	.64	.54

¹ Five feet above the bottom.² Mean for nine months only.

Bacteria, 1895.

MONTH.	CHESTNUT-HILL RESERVOIR GATE-HOUSES.			CHESTNUT-HILL RESERVOIR.			BROOK- LINE.	TAPS.	
	Sudbury.	Cochituate.	Effluent.	Surface.	Middle.	Bottom.	Gate-House.	Park Sq.	Mattapan.
January	222	154	145	. . .	. . .	. . .	105	95	69
February	119	48	46	39	54	56	40	25	23
March	460	516	270	. . .	. . .	. . .	268	146	64
April	162	59	64	43	168	201	59	55	37
May	157	207	36	78	80	191	92	50	85
June	94	597	39	89	320	168	21	62	106
July	87	156	143	72	320	364	64	89	156
August	191	835	157	93	221	113	49	56	34
September	171	216	103	128	83	83	40	58	37
October	283	371	186	49	118	169	157	50	17
November	370	144	49	54	54	55	58	50	19
December	122	19	55	¹ 55	¹ 46	¹ 45	44	65	23
Mean	203	235	108	² 70	² 146	² 145	83	67	56

¹ Two weeks only.² Ten months only.

Maintenance of Western Division for 1895-96.

DRAFTS.	Western Division.	Basins.	Sudbury Aqueduct.	Cochituate Aqueduct.	Lake Cochituate.	Pegan Filters.	Chestnut-Hill Reservoir.	Obseant-Hill Driveway.	Brookline Reservoir.	Fisher-Hill Reservoir.	Biological Department.	Inspection Department.	Filtration.	Totals.
February 1, 1895 . .	\$644 37	\$521 39	\$52 23	\$111 41	\$119 05	\$96 13	\$112 35	\$295 77	. . . . .	\$570 15	\$89 94	\$82 29	\$141 67	\$2,886 75
March 1, . .	1,565 40	370 30	452 43	99 00	171 06	279 00	755 97	766 24	\$83 00	303 15	259 13	499 87	. . .	5,604 55
April 1, . .	1,492 40	457 25	469 20	613 80	157 52	246 49	1,407 59	914 27	39 00	706 61	427 89	361 56	. . .	7,293 58
May 1, . .	1,397 73	738 50	567 62	227 11	220 21	279 45	1,124 46	859 43	107 03	409 54	296 99	391 65	. . .	6,619 72
June 1, . .	1,280 54	703 89	876 75	246 53	223 67	296 37	1,115 35	680 38	240 00	398 06	417 42	419 09	. . .	6,898 06
July 1, . .	1,467 11	690 72	512 08	400 25	231 27	316 30	1,917 67	1,161 90	362 80	161 75	353 25	433 18	. . .	8,008 28
August 1, . .	1,304 53	805 31	496 67	265 99	323 73	217 42	1,268 70	981 06	388 50	173 75	589 55	507 22	. . .	7,317 43
September 1, . .	1,292 97	726 97	724 41	102 41	235 14	277 31	1,708 54	831 64	335 25	135 50	313 98	523 83	. . .	7,207 95
October 1, . .	1,287 40	1,474 16	677 11	125 35	304 92	202 43	1,158 62	905 48	355 00	266 00	301 99	494 85	. . .	7,553 31
November 1, . .	1,350 78	644 55	1,039 17	148 61	298 02	230 00	1,031 98	810 46	231 00	172 05	393 58	474 12	. . .	6,824 32
December 1, . .	1,026 97	665 10	1,333 76	230 00	1,157 92	319 15	1,612 56	1,303 62	207 52	439 61	301 83	521 63	. . .	9,119 67
January 1 and 31, 1896,	1,721 89	1,502 11	1,211 19	461 92	364 15	571 29	2,185 34	1,247 37	212 25	192 45	459 69	643 85	. . .	10,773 50
Totals	\$15,832 09	\$9,300 25	\$8,412 62	\$3,032 38	\$3,806 66	\$3,331 34	\$15,399 13	\$10,757 63	\$2,556 35	\$3,928 62	\$4,205 24	\$5,353 14	\$141 67	\$86,057 12

**Table of Rainfall at Chestnut-Hill Reservoir for Year ending
December 31, 1895.**

DATE.	Inches.	Snow or Rain.	Duration.	DATE.	Inches.	Snow or Rain.	Duration.
Jan. 6	0.49	Snow and rain.	5.00 a.m. to	Mar. 25	0.13	Rain.	1.30 p.m. to 4.40 p.m.
" 7			6.45 a.m.	" 27	0.25	Snow.	11.15 p.m. to
" 7	0.25	Rain and snow.	6.45 p.m. to	" 28			2.45 p.m.
" 8			11.45 p.m.	" 29	0.06	"	11.00 p.m. to
" 10	1.08	Snow and rain.	7.30 a.m. to	" 30			2.00 a.m.
" 11			11 a.m.				
" 13	0.08	Rain.	4 a.m. to 10.30 a.m.	Total.	2.91		
" 16	0.50	Snow.	7.45 a.m. to 9.15 p.m.				
" 18	0.18	"	8.30 p.m. to 11.00 p.m.	April 2	0.44	Rain and snow.	11.40 p.m. to
" 21	0.24	Rain.	5.15 p.m. to	" 3			11.30 a.m.
" 22			5.00 a.m.	" 9	0.94	Rain.	1.00 a.m. to 9.45 a.m.
" 26	0.93	Snow and rain.	2.30 a.m. to 2.30 p.m.	" 10	0.26	"	12.40 a.m. to 5.30 a.m.
" 29	0.16	Snow.	5.00 a.m. to 2.30 p.m.	" 13	2.46	"	5.00 p.m.
Total.	3.91			" 14			to
				" 15	0.05	"	3.00 a.m.
Feb. 2	0.20	Snow.	9.30 a.m. to 3.45 p.m.	" 15			6.30 p.m. to
" 4	0.25	"	5.00 a.m. to 7.00 p.m.	" 16	0.17	"	1.30 p.m.
" 7	0.38	"	8.30 p.m. to	" 22			3.30 p.m. to 9.00 p.m.
" 8			7.45 a.m.	" 27	0.15	"	4.15 a.m. to 6.00 a.m.
" 21	0.05	"	10.15 p.m. to 11.50 p.m.	" 30	0.13	"	1.30 a.m. to 8.30 a.m.
Total.	0.88			Total.	4.60		
Mar. 2	0.52	Snow.	6.30 a.m. to 5.30 p.m.	May 4	0.09	Rain.	8.30 p.m. to 9.30 p.m.
" 4	0.07	Rain.	8.30 p.m. to 10.30 p.m.	" 12	1.19	"	11.00 a.m. to
" 6	0.11	Snow.	3.30 p.m. to 8.30 p.m.	" 13			9.30 a.m.
" 7	0.79	Rain.	3.30 p.m. to	" 14	0.65	"	9.30 p.m. to
" 8			11.30 a.m.	" 15			10.00 a.m.
" 13	0.80	"	9.30 p.m. to	" 18	0.25	"	5.45 a.m. to 2.30 p.m.
" 14			9.30 a.m.	" 26	0.10	"	3.00 a.m. to 9.30 a.m.
" 15	0.16	Snow.	11.45 a.m. to	" 27	0.30	"	5.45 p.m. to 7.30 p.m.
" 16			10.30 a.m.	Total.	2.58		
" 22	0.02	"	2.30 a.m. to 7.30 a.m.				

Table of Rainfall at Chestnut-Hill Reservoir. — *Continued.*

DATE.	Inches.	Snow or Rain.	Duration.	DATE.	Inches.	Snow or Rain.	Duration.
June 1	0.29	Rain.	7.40 p.m. to 8.15 p.m.	Sept. 9	0.52	Rain.	9.30 p.m. to
" 3	0.11	"	1.20 p.m. to	" 10			4.00 a.m.
" 4			9.30 a.m.	" 11	0.75	"	2.00 p.m. to 3.05 p.m.
" 6	0.12	"	3.00 a.m. to 10.30 a.m.	" 12	0.29	"	12.30 a.m. to 2.00 a.m.
" 22	0.02	"	4.00 a.m. to 4.30 a.m.	" 18	0.10	"	8.00 a.m. to 3.00 p.m.
" 25	0.27	"	12.30 a.m. to 1.30 a.m.	" 26	0.05	"	5.00 a.m. to 6.00 a.m.
" 27	1.17	"	12.05 p.m. to	" 26	0.15	"	6.00 p.m. to
" 28			3.00 p.m.	" 27			12.30 a.m.
" 30	0.23	"	1.00 p.m. to 4.40 p.m.	" 30	0.29	"	2.30 a.m. to 6.30 a.m.
Total.	2.21			Total.	2.15		
July 4	0.50	Rain.	5.00 p.m. to 11.00 p.m.	Oct. 8	0.31	Rain.	11.15 a.m. to 4.00 p.m.
" 6	0.40	"	5.30 a.m. to 5.30 p.m.	" 12	7.55	"	1.30 p.m.
" 9	1.31	"	5.40 a.m. to 2.45 p.m.	" 13			to
" 13	0.45	"	11.30 a.m. to 11.30 p.m.	" 14			4.15 a.m.
" 16	0.05	"	12.10 p.m. to 6.30 p.m.	" 15	0.05	"	3.30 p.m. to 10.30 p.m.
" 22	0.18	"	12.45 a.m. to 2.30 a.m.	" 28	0.03	"	2.00 a.m. to 3.00 a.m.
" 27	0.03	"	9.00 p.m. to	" 31	1.30	"	4.20 p.m. to midnight.
" 28			12.30 a.m.	Total.	9.24		
" 30	0.63	"	3.00 p.m. to 5.30 p.m.				
Total.	3.55			Nov. 1	1.56	Rain.	Midnight, Oct. 31, to
Aug. 2	0.01	Rain.	2.30 p.m. to 3.00 p.m.	" 2	0.62	Rain and Snow.	7.30 a.m.
" 7	1.48	"	9.05 a.m. to 1.30 p.m.	" 3			10.45 a.m. to
" 12	0.44	"	2.00 a.m. to 9.00 a.m.	" 9	0.15	Rain.	1.00 a.m.
" 18	1.17	"	7.30 a.m. to 12.15 p.m.	" 10			11.30 a.m. to
" 24	0.01	"	7.45 p.m. to 9.15 p.m.	" 14	1.86	"	11.00 a.m.
" 28	0.08	"	10.40 p.m. to	" 15			4.30 p.m. to
" 29			12.30 a.m.	" 17	0.07	"	12.30 p.m.
" 31	0.72	"	7.00 p.m. to 10.00 p.m.	" 15	0.07	"	4.00 p.m. to 5.00 p.m.
Total.	3.91			" 17	0.81	"	12.30 p.m. to 10.30 p.m.
				" 20	0.68		12.15 a.m. to 4.45 a.m.
				" 20	0.39	Rain and Snow.	3.00 p.m. to
				" 21			12.30 a.m.

Table of Rainfall at Chestnut-Hill Reservoir. — *Concluded.*

DATE.	Inches.	Snow or Rain.	Duration.	DATE.	Inches.	Snow or Rain.	Duration.
Nov. 23	0.18	Rain.	5.30 p.m. to	Dec. 4	0.56	Snow.	9.00 p.m.
" 24			3.30 p.m.	" 5			to
" 25	0.12	"	12.50 p.m. to	" 6	0.60	Rain.	5.30 a.m.
" 26			2.00 a.m.	" 22			2.30 a.m. to 7.30 a.m.
" 26	1.25	"	3.15 p.m. to	" 27	0.34	"	1.00 a.m. to 4.00 a.m.
" 27			12.30 a.m.	" 30	0.67	"	7.30 p.m. to
				" 31			6.30 a.m.
Total.	7.69			Total.	2.33		
Dec. 2	0.16	Rain.	9.00 a.m. to 6.30 p.m.				

NOTE. — Total Rainfall for Year, 45.96 Inches.

[CHAP. 488.]

AN ACT

TO PROVIDE FOR A METROPOLITAN WATER SUPPLY.

Be it enacted, etc., as follows :

METROPOLITAN WATER BOARD.

SECTION 1. The governor, by and with the advice and consent of the council, shall appoint three water commissioners, who shall constitute the Metropolitan Water Board. Said commissioners shall hold office, one for the term of five years, one for the term of four years and one for the term of three years, beginning with the first Monday in May in the year eighteen hundred and ninety-five; and in the year eighteen hundred and ninety-eight, and annually thereafter, the governor shall appoint, as aforesaid, one member of said board to hold office for the term of three years, beginning with the first Monday in May in the year of his appointment. The governor, with the consent of the council, may remove any member of said board, and may appoint for the residue of the term, in the same manner in which the original appointment was made, a commissioner to fill any vacancy occurring by removal, resignation or otherwise. One of said commissioners shall be always a citizen of Boston, one shall be always a citizen of one of the other cities or towns in the water district hereinafter described, and one shall be always a citizen of this Commonwealth. The chairman of said board shall receive a salary of five thousand dollars a year, and the other members a salary of four thousand five hundred dollars a year.

OFFICERS AND ACCOUNTS.

SECT. 2. The governor shall, as soon as may be after the appointment of said board, and annually thereafter on or before the first Monday of May, designate one of their number to serve as chairman for the ensuing year; said board shall from time to time appoint an engineer, secretary, and such other agents, officers, clerks and other employees as said board may deem necessary, shall determine the duties and compensation of such appointees, and may remove the same at pleasure, and may employ counsel; shall at all times keep full, accurate, and separate accounts of the doings, receipts, expenditures, disbursements, assets and liabilities of said board, and include an abstract of the same in an annual report to the general court on or before the first Wednesday in January in each year, such report to be numbered as one of the series of public documents; and four thousand five hundred copies thereof to be printed annually.

METROPOLITAN WATER DISTRICT.

SECT. 3. Said board, acting for the Commonwealth, shall construct, maintain and operate a system of metropolitan water works substantially in accordance with the plans and recommendations of the State Board of Health, contained in their report to the legislature of the year eighteen hundred and ninety-five, and shall provide thereby a sufficient supply of pure water for the following named cities and towns, and the inhabitants thereof, to wit: — The cities of Boston, Chelsea, Everett, Malden, Medford, Newton and Somerville, and the towns of Belmont, Hyde

Park, Melrose, Revere, Watertown and Winthrop, which cities and towns shall constitute the Metropolitan Water District; shall secure and protect the purity of said water; shall on application furnish water to any city or town aforesaid that at the time of application owns its water pipe system; shall on application admit any other city or town, any part of which is within ten miles of the state house, into said water district, and furnish water to the same on the terms prescribed by this act for the cities and towns aforesaid, and on such payment of money as said board may determine; shall on application furnish water to any water company owning the water pipe system in any town within said ten miles, on such water company assuming the assessments of the town, if any, and making such payment of money as said board may determine; and may from time to time furnish water to any other city, town or water company, on such payment of money as said board may determine. All payments of money aforesaid shall be distributed to the cities and towns in said district in proportion to the total amount of the annual assessments theretofore paid by them respectively. Said board shall furnish said water to the city, town or company, by delivering the same into a main water pipe, reservoir, or tank of the city, town, or company, under sufficient pressure for use without local pumping, unless delivered in some other manner by mutual agreement between the parties interested; and shall have the direction and control of the connections between the metropolitan and local systems. Said board may utilize the fall of water at any dam under their charge, and may thereby produce power or electricity, and may transmit such power or electricity by pipes, wires, or other suitable means, and sell the same, or the right to use such water, by written or other contract, to run for a term not exceeding fifteen years. Any person or corporation authorized by said board shall have all the powers relating to the production, sale and transmission of power and electricity given by this act to said board.

WATER SOURCES.

SECT. 4. Said board may take, by purchase or otherwise, the waters of the south branch of the Nashua river, at and above a point above the dam of the Lancaster Mills in the town of Clinton, but shall allow not less than twelve million gallons of water to flow from a reservoir above said dam in each week, and such further quantity, not exceeding twelve million gallons a week, as the owner of said mills shall from time to time certify to be necessary for use therein and in other buildings now or hereafter owned by him, for domestic or manufacturing purposes, other than the production of water power, and said board, in regulating the flow of said quantities, shall, as far as practicable, conform to any reasonable request in writing of the owner of said mills; said board may also take the waters of Sandy pond, so-called, in the town of Clinton, and the waters which may flow into and from said pond or river, and the tributaries thereof above said point; may take such water rights as they deem necessary connected with said waters; said board shall forthwith, after taking the waters of said Nashua river, take by purchase or otherwise all real estate which will be submerged or flooded, or submerged to an increased depth, by the construction of the proposed reservoir on the Nashua river hereinafter provided for, and all parcels of real estate above the dam of said reservoir used for mill purposes and owned by the owner of any mill property of which any part will be submerged or flooded by the construction of said reservoir, including all the machinery used on such real estate and tenements for operatives; shall, on or before the first day of January in the year eighteen hundred and ninety-eight, take all the lands and all the ponds, basins, reservoirs, filter beds, dams, aqueducts, conduits, pumping stations, pipes, pumps, and other property held by the city of Boston for the

purpose of supplying water or for the purpose of storing or of protecting or preserving the purity of the water, and situated westward of Chestnut Hill reservoir in said city and westward of the intersections of the main pipes to be laid from Chestnut Hill reservoir to Spot pond, with the main pipes which convey water from the Mystic distributing reservoir; also the pumping station at Chestnut Hill reservoir and lands under and surrounding the same, and the pipes and aqueduct leading thereto; also Spot pond, so-called, in or near the town of Stoneham, and the lands under and surrounding the same, now owned by the cities of Malden and Medford and the town of Melrose, or either of them, held for the purpose of water supply or of protecting or preserving the purity of the water, and the pumping stations and pumps thereon; any or all of the aforesaid lands to be taken in fee or otherwise, as said board may determine. Said board may take any other lands in fee, easements, rights and other property that said board may deem necessary or desirable for carrying out the powers and duties conferred upon them by this act.

RECORD OF TAKING.

SECT. 5. Said board, to take any property by right of eminent domain, shall sign and cause to be recorded in the registry of deeds for the county and district in which the property to be taken is situated, a statement containing a description thereof, as certain as is required in a common conveyance of land, and stating that the same is taken for the Metropolitan water works; and upon such recording the ponds, works, lands, waters, easements, rights and other property described in said description shall be taken for the Commonwealth. Said board, upon entering upon any land for the purpose of using the same for carrying out any of the purposes of this act, shall sign and cause to be recorded in the registry aforesaid a statement containing a general description of the land and the purposes for which it is to be used, and the probable time for which the same is to be used, and after they have taken any property under the right of eminent domain shall notify the owner thereof, and on the request of the owner within three years after such taking, shall, within thirty days after such request, furnish him with a plan or description, in writing, of his land or other property so taken.

RESERVOIRS.

SECT. 6. Said board shall forthwith, after taking the waters of said Nashua river, construct a storage reservoir upon said Nashua river above said dam of the Lancaster Mills; shall forthwith construct the reservoir in Southborough already partially constructed by the city of Boston, and the dams thereof, and assume and carry out the agreement made by said city with the town of Southborough, and all contracts made by said city relating to the building of said reservoir; may construct other reservoirs, and may raise the level of any pond or reservoir under their charge. Said board may, as they deem desirable in constructing, or raising the level of, any pond or reservoir, raise or alter or discontinue parts of any railroad or public ways, and in case of a railroad shall make such raisings or alterations of the railroad, or construct upon existing or other locations, parts of the railroad to take the place of the parts so discontinued, as, and in such manner as, shall be mutually agreed upon by said water board and the board of directors of the railroad company; and if they cannot agree thereon then as, and in such manner as, shall be determined on the application of either party, in writing, by the board of railroad commissioners of this Commonwealth, who are hereby authorized and directed to adjudicate finally upon the same; and if said water board shall be of the opinion that the making of any such change of grade, alteration or construction requires

that lands be taken therefor, said board shall, in the name of the Commonwealth, take such lands and convey the same to the railroad company to be thereafter held and used as the board of directors of such company may determine, and the railroad company may if it desires locate its lines over any lands so conveyed to it, and when said new lines of railroad are completed the railroad company may discontinue the operation of the portions of its existing lines for which the new lines are substituted, and may maintain and operate said new lines of railroad; and said water board shall build the dam of any pond or reservoir constructed, or whose level is raised, as aforesaid, and make the raisings or alterations of the public ways aforesaid, and build in place of the parts of public ways discontinued, as aforesaid, such other reasonable and suitable ways, which shall thereafter be highways, as, and in such manner as, shall be mutually agreed upon by said water board and the county commissioners of the county in which such dam is to be built; or if they cannot agree thereon then as, and in such manner as, shall be determined on the application of said board, in writing, by the highway commission of this Commonwealth, which commission is hereby authorized and directed to adjudicate finally upon the same. Said water board, in flooding or otherwise affecting any burial ground, shall conform to any reasonable requirements relating thereto of the board of health of the city or town in which the same is situated.

CHESTNUT HILL RESERVOIR.

SECT. 7. Said water board shall forthwith lay pipes to connect the pumping station at Chestnut Hill reservoir with the main water pipes through which water is now supplied to the cities of Somerville, Chelsea and Everett, and the Charlestown district of the city of Boston, and with Spot pond, and on the first day of January in the year eighteen hundred and ninety-eight the contracts of the city of Boston with the cities of Somerville, Chelsea and Everett, described in, and confirmed by, chapter three hundred and fifty-one of the acts of the year eighteen hundred and eighty-six, for a supply of water, shall be cancelled. Said board shall also forthwith, after taking the waters of Nashua river as aforesaid, connect said river with the tributaries of said reservoir in Southborough.

DELIVERY OF WATER TO LANCASTER MILLS.

SECT. 8. Said board, until they shall have completed the dam of said proposed reservoir on the Nashua river, and rebuilt the dam of said Lancaster Mills, shall, unless otherwise agreed by said board and the owner of said mills, deliver each week day at, and at the level of, the present top of the dam of said mills at least one million gallons of the water of said river, unpolluted by any acts or doings of said board, conforming in the delivery of said quantity, so far as practicable, to any reasonable request in writing of the owner of said mills.

CONSTRUCTION OF BUILDINGS, ROADS, ETC.

SECT. 9. Said board in carrying out the powers and duties hereinbefore conferred upon them may construct and maintain buildings, machinery, roads, conduits and aqueducts; may lay and maintain pipes, drains and wires; may alter or change the grades or directions of any water course; may carry and conduct any aqueduct, conduit, pipe, drain or wire under or over any water course, or any railroad, street or other way, in such a manner as not unnecessarily to obstruct or impede travel thereon; may dig up any such road, street or way, and lay, maintain and repair aqueducts, conduits, pipes, wires and other works beneath the surface thereof, conforming to any reasonable regulations made by the mayor and aldermen of cities and the selectmen of towns, respectively,

wherein such works are performed, and restoring, so far as practicable, any such road, street or way, to as good order and condition as the same was in when such digging was commenced; said board may enter upon and use the lands of others; may take down dams to such an extent as they may deem necessary for prosecuting their works, and shall rebuild such dams whenever the necessity for keeping them down ceases; shall use such lands and do all work relating to such dams, in a reasonable manner with regard to the interests of the owners thereof, and, so far as practicable, shall heed all reasonable requests made by such owners; and in general may do any other act or thing necessary or proper for carrying out the powers and duties conferred upon them by this act.

OPERATION OF WORKS TAKEN FROM BOSTON.

SECT. 10. Said board, on or before the first day of January in the year eighteen hundred and ninety-eight, shall commence the operation of the works taken by them from the city of Boston, and shall thereafter keep the same and all water works constructed by them, and all bridges which they may build across said reservoir upon the Nashua river, and (until they abandon the same by notice in writing to said city) said Chestnut Hill reservoir, safe, and shall have charge of, use, maintain and operate the same, and the Commonwealth shall exclusively be responsible for all damages caused thereby or by any defect or want of repair therein; said board shall have the exclusive right and control over all ponds and reservoirs used by them in supplying water, and may order all persons to keep from entering in, upon or over, the waters thereof and the lands of the Commonwealth, city or town, surrounding the same; may inspect the water works and fixtures in any city or town supplied wholly or in part from the works under their charge, and may take all proper measures to determine the amount of water used and wasted and to prevent the improper use or waste of water.

PURCHASE AND SALE OF PROPERTY.

SECT. 11. Said board and any city, town or water company aforesaid, may agree with each other for the storing or pumping of water, or the furnishing of the same as aforesaid by either party to any city, town or company; and any such city, town or company may sell to said board, and said board may purchase any property of such city, town or company, whether taken by eminent domain or otherwise, that said board may deem desirable for use in furnishing, as aforesaid, water to any city, town or water company; and said board may sell at public or private sale any property, real or personal, whether taken by eminent domain or otherwise, no longer needed for the water works under their charge, or may from time to time lease any property not then so needed. The proceeds from the operations of said board shall be paid into the treasury of the Commonwealth.

EXPENSES AND DAMAGES.

SECT. 12. Said board shall incur such expenses as they deem necessary in constructing, operating and maintaining the water works under their charge; may agree with the party injured, upon the damages sustained by any city or town by the taking or use of its lands, ponds, reservoirs, water sources, aqueducts or other property, or the cancellation of contracts, as aforesaid; the damages sustained by the town of Clinton by any interference with its sewerage system or with its drainage rights or privileges; the damages sustained by any person or railroad or other corporation in property by any taking of property or by any change of grade, alteration or discontinuance of any railroad or public way, or by the construction or maintenance of any reservoir or other work, or by the interference with the use of any water, or by any other

act or thing done by said board under this act; shall save harmless the several cities and towns within which any road, street or way is dug up as aforesaid, against all damages for injuries resulting from a defect or want of repair in any road, street or way, caused by such digging up, or by constructing, laying, maintaining or repairing any aqueduct, conduit, pipe, wire or other works therein, and shall furnish without charge to all towns within which any work is done under authority of this act such additional police protection as may be necessary in consequence thereof: *provided*, said board shall have due and reasonable notice of the claims for such damages and opportunity to make a legal defence thereto.

PETITION FOR JURY.

SECT. 13. Said board, city, town, person or corporation, if they cannot agree upon any damages, sustained as aforesaid, may, except in the cases in which payment is otherwise provided for in this act, within two years after the day of the taking of any land, water, easements or other property, or of the use of any property, or of the making of any change of grade, alteration, discontinuance or location of a way or railroad, or of the doing of any other act or thing causing the damage, file in the office of the clerk of the superior court for the county in which the property taken, used or affected in value by such taking or other act of said board is situated, a petition, signed by the petitioner or the attorney of the petitioner, for a jury to determine such damages, and thereupon, after such notice as said court shall order, the damages so sustained shall be determined by a jury in said court, in the same manner as damages for lands taken for highways are determined. In determining any damages caused by any change of grade or discontinuance of a public way or railroad, or the substitution of a part of a public way or railroad for another part, there shall be taken into account any benefit to the party injured received from this act and anything done thereunder. Interest shall be included in such damages from the date of the taking, or the doing of the act or thing causing the damages, and costs shall be taxed and execution issued as in civil cases, against the Commonwealth in case the petitioner prevails, and against the petitioner in case he does not prevail. Damages for the temporary use of or injury to property may, on the request of the petitioner, be assessed by monthly payments, to be continued so long as the property is used.

COMMISSIONS MAY BE APPOINTED TO DETERMINE DAMAGES.

SECT. 14. Said board, upon the application of the owner of any real estate taken for said proposed reservoir upon the Nashua river, or the owner of any real estate entered upon and used, or of any real estate injured by the taking of the waters of said Nashua river, whether said real estate is within or without the Commonwealth, or of any real estate not taken but directly or indirectly decreased in value by this act or the doings of said board thereunder, situated in the town of West Boylston or in that part of the town of Boylston on the northerly side of said proposed reservoir, or in that part of the town of Clinton on either side of River or Grove streets, between the dam of said proposed reservoir and a line drawn from the northerly corner of Oak and Boylston streets to the northerly corner of said Grove and Nashua streets, and not owned on the first day of April in the year eighteen hundred and ninety-five, by the owner of the Lancaster Mills, may agree with such owner upon the damages to be paid for such taking, injury or decrease in value, and if said board and the owner of any such real estate cannot agree upon such damages, such owner may, within two years after the first taking of water, or of land for said reservoir, under the right of eminent domain, file in the clerk's office of the supreme judicial court for the

county of Worcester, in term time or vacation, a petition for the determination of such damages, and thereupon said court, after notice by publication in some newspaper published in the county of Worcester, and in such other manner as the court may order, that all persons entitled to file such petitions will be heard by said court on a day therein named, and a hearing thereon; shall from time to time appoint one or more commissions, each consisting of three disinterested persons, and may after notice and hearing fill any vacancy occurring in any such commission until all petitions referred to it have been heard and determined. Each of said commissions shall, after notice and hearing, determine the damages specified in all such petitions as may be filed as aforesaid and referred to it by said court; and if the owner of any such real estate, no part of which is taken but which is decreased in value, shall in the petition aforesaid signify his willingness to surrender the real estate, or if there is a mill thereon, the real estate and machinery thereon, to the Commonwealth, the commission shall also determine the value of such real estate, or real estate and machinery, and interest may be included in such damages and in such value at such rate and for such time as the commission may deem just and equitable. Said commissions shall determine the damage to and value of real estate, machinery and business, and from time to time report their determinations on the petitions of such owners to said court. In case any individual or firm owning on the first day of April in the year eighteen hundred and ninety-five an established business on land in the town of West Boylston, whether the same shall be taken or not under this act, or the heirs or personal representatives of such individual or firm, shall deem that such business is decreased in value by the carrying out of this act, whether by loss of custom or otherwise, and unable to agree with said board as to the amount of damages to be paid for such injury, such damages shall be determined and paid in the manner hereinbefore provided. The words "real estate" as used in this section shall include water rights, and in the case of mills all machinery thereon.

PAYMENT OF DAMAGES.

SECT. 15. Said board shall, upon agreeing upon any damages, or upon the acceptance by said court of any determination specified in the preceding section, notify the owner that they will pay the damages, or in case the petitioner offers to make surrender, if they so prefer, they will pay the value so agreed upon or determined, and if any such owner shall in accordance with such notice and within one year after being so notified, deliver a release of such damages or a deed of the real estate, to and satisfactory to, said water board, said water board shall certify to the treasurer of the Commonwealth the amount to be paid such owner, and said treasurer shall pay the same from the proceeds of the bonds hereinafter provided for. Said water board, or any persons whose property is taken under the right of eminent domain, or entered upon or injured by the taking of said water, if dissatisfied with any determination of damages made by any commission, may at the term on which such determination is filed in court, or at the succeeding term, claim a trial by jury to determine such damages, and thereupon the damages shall be determined by a jury in said supreme judicial court as provided in section thirteen of this act.

PAYMENT TO CITY OF BOSTON AND TOWNS OF BOYLSTON AND WEST BOYLSTON.

SECT. 16. The treasurer of the Commonwealth shall, from the proceeds of the bonds hereinafter provided for, reimburse the city of Boston for all moneys paid or that may hereafter be paid by said city for land damages, or otherwise, in connection with the location, building or

maintenance of reservoirs or basins not yet built, or for lands taken for the preservation or protection of the purity of the waters of any reservoirs, or basins or of the tributaries thereof, and shall pay as part of the expenses of said metropolitan water works to the town of Boylston the sum of two thousand dollars a year, and to the town of West Boylston the sum of twelve thousand dollars a year for the year of and each year succeeding said taking of the waters of said Nashua river, so long as each of said towns remains a municipality, and shall pay no tax or other payment to either of said towns on account of any property held by said water board for the purposes of a water supply.

METROPOLITAN WATER LOAN.

SECT. 17. The treasurer and receiver general shall, from time to time, on the request of said board, issue negotiable bonds in the name and behalf of the Commonwealth, and under its seal, to an amount not exceeding twenty-seven million dollars, designated on the face thereof, Metropolitan Water Loan. Said bonds shall be deemed a pledge of the faith and credit of the Commonwealth, shall be countersigned by the governor; shall have the principal and interest made payable thereon, in gold coin of the United States of America or its equivalent; shall bear interest payable semi-annually on the first days of January and July of each year; shall be registered, or with interest coupons attached; shall be payable within such terms not less than thirty nor more than forty years, and shall bear such rates of interest not exceeding four per cent. per annum, and be issued and disposed of in such amounts and in such modes and at such times and prices as the treasurer and receiver general, with the approval of the governor, shall from time to time determine. Said treasurer shall, on issuing any of said bonds, establish a sinking fund, and determine the amount to be paid thereto each year, sufficient with its accumulations to extinguish the debt at maturity.

PROCEEDS FROM SALES OF PROPERTY AND BONDS.

SECT. 18. Said treasurer shall apply the proceeds from the sales of property made as hereinbefore provided, and the proceeds from the sales of said bonds, exclusive of the amounts received from premiums, to the payments for the property taken by said board, the payment of the damages aforesaid, and the payment of the expenses of construction of said water works, and the other payments specified in this act, and shall apply any premiums received from sales of said bonds, any assessments hereinafter provided for paid by the cities and towns, and the proceeds from the operations of said board, exclusive of the proceeds from sales of property, to the payment of the interest, sinking fund requirements and expenses of maintenance and operation of said water works, and shall take the balance required for said payments, if any, from the proceeds of said bonds, and shall apply the surplus, if any, to the payment of said interest, sinking fund requirements and expenses, for the following year. Said treasurer shall advance to such person as shall have been designated by said water board and shall have given a bond with sufficient sureties, to be approved by the auditor of the Commonwealth, in the sum of ten thousand dollars, such sums, not exceeding ten thousand dollars at any time, as said auditor may certify to be necessary to enable said board to make direct payment upon the pay rolls and other accounts of said board, and such persons shall, as soon as may be after expending any sum so advanced, and in all cases within thirty days from the receipt of any such sum, file with the auditor a statement in detail of the moneys expended subsequent to the last previous accounting, approved by said water board, and where it is practicable to obtain them, also file receipts or

other like vouchers of the persons to whom the payments have been made.

ESTIMATE AND APPORTIONMENT OF ANNUAL EXPENSES.

SECT. 19. Said treasurer shall in each year estimate the amount, in addition to the premiums from sales of said bonds and the proceeds from the operations of said board, exclusive of the proceeds from sales of property, required during the year to pay the interest, sinking fund requirements, expenses of maintenance and operation of said water works, and shall apportion to the city of Boston the proportion of such amount that the valuation of said city for the preceding year bears to the total of all such valuations of all cities and towns in said water district: *provided, however*, there shall be included only one sixth of the total valuation of any such city and town which has not reached the safe capacity of its present sources of supply in a dry year, as determined by said water board and certified to said treasurer, and has not made application to said board for water, and the remainder to the other cities and towns in said district, one third in proportion to their respective valuations and the remaining two thirds in proportion to their respective populations, including however only one sixth of the total valuation and one sixth of the total population of any such city and town which has not reached the safe capacity of its sources or of the sources of supply of the water company by which a town is supplied, or has not made application for water as aforesaid; and *provided, further*, that any city or town assessed upon its full valuation and population, which furnishes a part of its water supply from its own works or receives a supply from a water company, shall be allowed and credited in its apportionment with a sum equal to twelve dollars for each million gallons of water furnished as aforesaid, as determined by said water board and certified to said treasurer, and *provided, further*, that no such amount shall be so apportioned until the year eighteen hundred and ninety-eight, and in said year only the amount of three hundred thousand dollars shall be apportioned, and the sums of money expended by the state board of health under chapter four hundred and fifty-nine of the acts of the year eighteen hundred and ninety-three and chapter four of the resolves of the year eighteen hundred and ninety-five, and in the succeeding years the said amount of three hundred thousand dollars and two hundred thousand dollars additional for each year thereafter shall be so apportioned until the entire amount required as aforesaid is reached, and thereafter such entire amount shall be so apportioned. Said treasurer shall in each year notify each city and town of the amount of its assessment, and the same shall be paid by the city or town into the treasury of the Commonwealth at the time required for the payment and as part of its state tax.

CONTROL AND DISTRIBUTION OF WATER.

SECT. 20. The water board, water commissioners or superintendent of any city or town in the metropolitan water district, shall for their respective cities or towns, on and after the first day of January in the year eighteen hundred and ninety-five, have the charge and control of the water sources, water and water works owned and used by said city or town and not taken or used by said metropolitan water board as herein provided. Said water board, water commissioners or superintendent shall distribute and control the use of the water so furnished, and apply meters and extend the pipes and other work as said water board, water commissioners or superintendent may deem expedient; shall keep the pipes, fixtures and other works under their charge in good condition and repair, but shall not expend in any year more than the amount appropriated by the city or town therefor. Said water

board, water commissioners or superintendent, with the approval of the mayor or selectmen, shall determine the rate to be paid for water by the owner of the premises to which the water is furnished, or by the person or persons using the water: *provided, however*, that the minimum rates to be paid for water, and the premises to which the high service supply shall be furnished, shall be subject to the approval of said metropolitan water board. Any water board, water commissioner or superintendent as aforesaid shall for the water works under his charge do all the acts and things relating to buildings, machinery, roads, conduits, aqueducts, pipes and drains, which said metropolitan water board is authorized to do for the water works under their charge, and may take lands therefor, in fee or otherwise, and shall do all such acts and things and make all such takings in the manner in which said metropolitan water board are authorized to do similar things, and the damages sustained shall be recovered of, and paid by, the city or town for which such water board, water commissioners or superintendents are appointed or elected, in the same manner as damages caused by similar acts of said metropolitan water board are recovered of, and paid by, the Commonwealth.

APPLICATION OF INCOME.

SECT. 21. The income received in each city or town from the water works under the charge of its water board, water commissioners or superintendent, shall be applied to the payment of the expenses of maintenance and operation incurred by said water board, water commissioners or superintendent; the interest and sinking fund requirements of all bonds, notes or scrip of the city or town issued on account of the water works of such city or town; the assessment of the city or town to be paid to the treasurer of the Commonwealth as hereinbefore provided; the expenses of the extension of the works; and the balance, if any, as the city or town may determine. If such income in any year shall not be sufficient for said payments the balance required therefor shall be raised by taxation or by loan, as the city or town may determine; and the city or town is hereby authorized to assess such taxes and make such loans without further authority from the legislature.

WORCESTER AND CERTAIN TOWNS MAY TAKE WATER.

SECT. 22. The towns of Clinton, Sterling, Boylston, West Boylston, Lancaster, Holden, Rutland, Princeton, Paxton and Leicester, and the city of Worcester, may take from the south branch of the Nashua river, above the dam of the proposed reservoir on said river, so much of the water thereof as they have already been or may hereafter be authorized by the legislature to take, for supplying their inhabitants with water, and in case either of the towns of Lancaster, Holden, Rutland, Princeton, Paxton or Leicester, or the city of Worcester, shall so take water, it shall pay to the Commonwealth, to be paid into the sinking funds for said bonds, a fair proportion of the cost incurred by the Commonwealth for said water and for the construction, maintenance and operation of said works, the same to be determined by the engineer of said board and an engineer to be appointed by the city or town, and if they cannot agree, the proportion shall be determined by a master to be appointed by the supreme judicial court on the petition of either party interested, and the report of such master made and accepted by said court shall be final and binding on all parties.

USE OF WATER IN DISTRICT RESTRICTED.

SECT. 23. No city or town, any part of which is within ten miles of the state house, or any water company owning a water pipe system in

any such city or town shall, except in case of emergency, use, for domestic purposes, water from any source not now used by it except as herein provided or as shall be hereafter authorized by the legislature. If any town or towns in said district shall take the franchise, works and property in such town or towns, of any water company, the compensation to be allowed and paid therefor shall not be increased or decreased by reason of the provisions of this act. No town in said water district now supplied with water by a water company owning the water pipe system in such town, shall introduce water from the metropolitan water works until it shall first have acquired the works of such company.

SANITARY PROTECTION OF WATER.

SECT. 24. The state board of health is hereby authorized and required to make rules and regulations for the sanitary protection of all waters used by the metropolitan water board for the water supply of any city, town or water company aforesaid, and to transfer and deliver to said water board, such plans, maps and other information in their possession as will assist said board in carrying out the provisions of this act.

IMPROPER USE OF WATER PROHIBITED.

SECT. 25. No person shall take or divert any water of a water supply of any city or town in said water district from any water source, reservoir, conduit or pipe used for supplying such water to, or in any such city or town, or occupy, injure or interfere with any such water, or with any land, building, aqueduct, pipe, drain, conduit, hydrant, machinery or other work or property so used, and no person shall corrupt, render impure, waste or improperly use, any such water.

PRECEDING SECTION NOT TO APPLY IN CERTAIN CASES.

SECT. 26. The provisions of the preceding section shall not apply to any person in taking or diverting any such water or interfering with or occupying any water, land or works therein described, by permission of said metropolitan water board, or the water board, water commissioners or superintendent of any city or town having charge of the land, water or work; nor to the individual inhabitants of any city or town within the watershed of any water supply used by said metropolitan water board, or by any city or town aforesaid, in taking from the part of the supply or from the tributaries of the supply within their respective city or town limits so much of the water thereof as they shall need for their ordinary domestic household purposes, for extinguishing fires, or for generating steam.

ENFORCEMENT.

SECT. 27. Said metropolitan water board, and their employees designated for the purpose, shall enforce the provisions of this act, and of the rules, regulations and orders made thereunder, and may enter into any building, and upon any land for the purpose of ascertaining whether sources of pollution there exist, and whether the provisions of this act and of the rules, regulations and orders made as aforesaid are complied with; and, where the enforcement of any such provisions, rules, regulations or orders will require public works for the removal or purification of sewage, said metropolitan water board shall not enforce the same until they have provided such works, and the amount paid therefor shall be considered as part of the expenses of construction of the metropolitan water works, and such works shall be maintained and operated as a part of said water works.

JURISDICTION OF THE COURTS.

SECT. 28. The supreme judicial court or any justice thereof, and the superior court or any justice thereof, shall, in term time or vacation, on the petition of said board or any city, town, corporation or person interested, or of the attorney of any such petitioner, have jurisdiction in equity or otherwise to enforce the provisions of this act, and of any rule, regulation or order made under the authority of this act, and to prevent any violation of said provisions, rules, regulations or orders.

PENALTIES.

SECT. 29. Whoever shall do any of the acts herein prohibited, or shall violate or refuse to comply with any rule, regulation or order made under the authority of this act shall, on complaint or indictment therefor and conviction thereof, be punished for each offence by a fine not exceeding five hundred dollars, to be paid to the Commonwealth, or by imprisonment not exceeding one year in the house of correction, or by both such fine and imprisonment.

GENERAL LAWS.

SECT. 30. All general laws relating to the water supplies of cities and towns or the lands and other property used for such supplies shall, so far as they are not inconsistent with the provisions of this act, apply to and be observed in carrying out the purposes of this act.

CONSTRUCTION OF WORKS.

SECT. 31. In the construction of these works preference in employment shall be given to citizens of this Commonwealth.

SECT. 32. This act shall take effect upon its passage. [*Approved June 5, 1895.*]

APPENDIX C.

REPORT OF THE SUPERINTENDENT OF
EASTERN DIVISION.

OFFICE OF SUPERINTENDENT OF EASTERN DIVISION,
710 ALBANY STREET, BOSTON, January 31, 1896.

HON. JOHN R. MURPHY,

Water Commissioner:

DEAR SIR: I herewith submit the annual report of the Eastern Division of the Boston Water Department for the year ending January 31, 1896:

EXTENSION OF MAINS.

During the year there have been laid $26\frac{1}{4}$ miles of pipe-mains, and 16,421 feet of main pipe abandoned, making a total of 595.9 miles now connected with the system, an increase of 8.3 miles over the length laid last year.

There were laid for the Park Department, 3,674 feet of 10-in. pipe. This pipe is not included in the total amount named in our system.

A 48-inch high-service main has been laid from the connection with Fisher-Hill Reservoir, at Fisher avenue and Boylston street, Brookline, through Boylston, Walnut and Washington streets, Brookline, — through the Muddy River Park District to the junction of Huntington avenue and Heath street, Boston, where it was reduced to a 42-inch and a 36-inch. The 42-inch was continued through Huntington avenue, across Boylston street, through Clarendon and Newbury streets, crossing Arlington street and the Public Garden and Charles street on to Boston Common, where, at a point nearly in a line with Temple place, it was reduced to 30-inch, then continued 30-inch to a line with Winter street, where it was reduced to 16-inch, and continued to and connected with Park street.

Connections were made at Waite street, Gainsboro' street and Boston Common, with the 20-inch and 16-inch high-service mains, and branches left for connections at various other points.

This 42-inch line is now in commission as far as Huntington avenue and Gainsboro' street. There still remains about 200 feet to lay across the Boston & Albany Railroad bridge, on Huntington avenue, when this bridge is rebuilt the coming summer.

There has also been laid 4,600 feet of 36-inch pipe in Heath street, from the connection at Huntington avenue to the New York, New Haven & Hartford Railroad crossing on Heath street, and connection was made near Day street with the supply to Parker-Hill Reservoir. On account of change of grade of railroad no more could be done at this point, but this Roxbury and Dorchester line was continued by laying 2,000 feet of 36-inch pipe in Ruthven street and Walnut avenue.

We laid a temporary 2-inch lead pipe in March, 1895, from Moon Island to Long Island, and when the weather permitted, a 6-inch pipe was laid from Moon Island to Long Island, and also a new 6-inch pipe from Long Island to Galloupe's Island. A 4-inch pipe is being laid from Long Island to Rainsford Island.

A thorough monthly inspection has been made of all main pipes crossing over, under or through railroad bridges and culverts, and where made necessary by vibration, joints have been calked, and blocking and straps renewed.

GATES, OR STOP-COCKS.

The number of gates established during the year was 321. Of this number there were eight 36-inch, two 30-inch, two 24-inch and four 20-inch gates connected with the new high-service main, thirty-two gates were abandoned; making the total number now in service 6,648, all of which have been attended to in the matter of oiling, packing, etc.

RESERVOIRS.

Parker-hill Reservoir. — The grounds, buildings, fences and gate-house have received the usual attention, and are in good condition.

East Boston. — The reservoir grounds, gates and fences are in good condition.

South Boston. — This reservoir, which is not in use, and which probably will never be used again, is in a poor and leaky condition.

The fences will need painting the coming year. Some repairs have been made to the same during the past year.

HIGH-SERVICE STAND-PIPES.

The Breed's Island and Mt. Bellevue stand-pipes are in fair condition. The Mt. Bellevue tank and grounds have been kept open for the public during the past season. The buildings covering both will require some repairs, also painting, during the coming year.

The grounds at Mt. Bellevue are in good condition. It is now partly surrounded by a fence. This fence should be continued to enclose the grounds.

HYDRANTS.

Three hundred hydrants were established and 58 abandoned, making a net increase for the year of 242, and there are now 6,459 in service connected with the system. Of the new pattern independent Post hydrant, 20 were put in during the year. These seem to be a favorite hydrant with the Fire Department in hazardous districts, and I recommend that more of them be used.

We have still 1,103 Boston hydrants, old pattern, in use. These should be discontinued as rapidly as possible and replaced by Post hydrants.

Requests from the Fire Department, such as raising and lowering hydrants, etc., have received prompt attention. All hydrants have been examined, tested and oiled during the summer months, and during the winter months a daily inspection and test has been made of all hydrants connected with the system.

This department supplies the Fire Department gratis with the salt used on hydrants, which we deliver to the various fire-houses upon request. During the year 4,194 bushels of salt have been delivered to them. We have used 1,756 bushels in care of gates and hydrants.

WATER-POSTS.

Twelve new water-posts were established, making the number now in use 378. These are established and locations changed upon request of the Superintendent of Streets, or Deputy of Street Watering.

FOUNTAINS.

Two new fountains have been established for man and beast, and one for beast only; and one change made as to location.

I earnestly recommend that more of these fountains for beasts be established during the coming year. The opportunities offered for procuring water by horses and dogs are all too few at present. The public safety requires that every opportunity should be offered dogs to obtain water.

SERVICE-PIPES.

During the year 2,734 service-pipes have been laid, with an aggregate length of 61,615 feet, and 411 have been abandoned, making a net increase of 2,323 pipes during the year. Of the abandoned pipes 74 services, equalling 910 feet, have been the $\frac{1}{2}$ -in. services connected with the old Jamaica Pond system, which were replaced by $\frac{5}{8}$ -in. from our system. There still remains a few of the old Jamaica Pond Aqueduct service-pipes.

Under the law of laying out new streets, we were obliged to lay 65 service-pipes, from which no revenue is at present derived.

METERS.

Cochituate Division. — Three hundred and nineteen meters have been set, 248 have been discontinued, 1,296 have been changed, and 6 have been lost in service during the year; making a net gain of 65, and the total number now in use 4,398.

Mystic Division. — Thirty-eight meters have been set, 27 have been discontinued, 147 have been changed, and 1 has been lost in service during the year; making a net gain of 10, and the total number now in service 504.

BLASTING.

We have had seven breaks of main pipe by blasting, but the most serious one occurred on the evening of November 27, 1895, at Walnut street, Brookline, when a sewer contractor for the town of Brookline exploded a blast within a few feet of our new 48-inch high-service main. This blast broke the main, and a piece, V-shaped, about 6 feet long and 3 feet wide on the widest end, was blown out.

This break discharged water at the rate of seven and one-half million gallons per hour. We pressed every available man into service, and at 4.30 A.M., November 28, we had a new connection made at another point, our high-service district being supplied meanwhile from Parker-Hill Reservoir, which had been held full for an emergency.

MAINTENANCE.

The work of relaying mains in a large number of streets in the city proper has been delayed the past year on account of the large amount of work on extensions. Some of these should be delayed no longer than the coming season, as the portions we have taken out indicate that it is hardly safe to continue them through another winter, and I hope to be able to do a large portion of the relaying already authorized by the Water Commissioner.

Of repairs on pipes of all sizes we have made 1,535 during the year. Of those on main-pipes (215), we have found the most numerous causes to be defective joints (71), defective packing (58), defective stop-cocks (19), and settling of earth (25).

The causes of leaks and stoppages on service-pipes, which number 1,320, are many, but chief among them are: Rust, 557; fish, 39; struck by pick, 75; settling of earth, 235; and defective pipe, 67.

The following tables show in detail the work performed by this department:

Table showing the Length of Supply and Distribution of Mains laid and the Number of Stop-cocks established during the Year of 1895, and the Length connected with the Sudbury and Cochnituate Works, January 31, 1896.

DIAMETER OF PIPES IN INCHES.																		Total.
	60	48	42	40	36	30	28	24	20	16	12	10	8	6	4	3	2	
EASTERN DIVISION.																		
Length in use Jan. 31, 1895		25,571		23,054	26,298	62,464	244	56,784	61,483	76,629	847,251	53,195	375,117	1,250,421	133,341	9,056	. . . .	3,000,908
Stop-cocks in same		1		7	16	30		47	37	112	1,302	72	737	3,341	655	2	. . . .	6,359
Length laid or relaid during the year		8,290	15,478		6,640	8,373		708	1,830	3,041	31,124	1,562	18,664	39,137			3,745	138,592
Stop-cocks in same					8	16		4	8	11	69	7	49	150	9			321
Length abandoned during the year											565		740	6,532	7,654	930		16,421
Stop-cocks in same											2		1	19	9	1		32
Length in use Jan. 31, 1896		33,861	15,478	23,054	32,938	70,837	244	57,492	63,313	79,670	877,810	54,757	393,041	1,283,026	125,687	8,126	3,745	3,123,079
Stop-cocks in same		1		7	24	36		51	45	123	1,369	79	785	3,472	655	1		6,648
WESTERN DIVISION.																		
Length in use Jan. 31, 1896	266	16,051		1,435	1,166	2,140				20	2,043			360				23,481
Stop-cocks in same		5			3					2	4			2				16
Total connected with works Jan. 31, 1896 .	266	49,912	15,478	24,489	34,104	72,977	244	57,492	63,313	79,690	879,853	54,757	393,041	1,283,386	125,687	8,126	13,745	3,146,560 ft. or 595.9 miles.

¹ Deduct January.

Statement of Hydrant, Blow-off and Reservoir Pipes, January 31, 1896.

	DIAMETER IN INCHES.							Total.
	16	12	10	9	8	6	4	
Total length in use January 31, 1895	272	6,970	. . . . .	2,975	28	19,676	10,747	40,668
Length laid or relaid during the year	200	15	100	. . . . .	. . . . .	1,826	50	2,191
Length abandoned during the year . . . . .	. . . . .	7	. . . . .	. . . . .	. . . . .	49	118	174
Total length in use January 31, 1896	472	6,978	100	2,975	28	21,453	10,679	42,685

Statement of Service-pipes Laid and Abandoned during the Year ending January 31, 1896.

SIZE OF SERVICE.	Boston.		South Boston.		East Boston.		Roxbury.		Dorchester.		West Roxbury.		Brighton.		Total.	
	Number of services.	Length in feet.	Number of services.	Length in feet.	Number of services.	Length in feet.	Number of services.	Length in feet.	Number of services.	Length in feet.	Number of services.	Length in feet.	Number of services.	Length in feet.	Number of services.	Length in feet.
6-inch laid	27	563	1	31	5	174	1	39	2	72	1	55	37	934	1	21
4 " "	4	76	2	37	1	24	1	24	2	69	1	48	4	76	4	76
4 " abandoned	11	345	2	37	1	24	1	24	2	69	1	48	19	545	4	54
3 " laid	4	54	1	57	6	121	3	102	4	49	28	890	3	110	28	767
3 " abandoned	13	507	1	57	6	121	3	102	4	49	28	890	3	110	28	767
2 " laid	2	98	1	12	6	203	1	31	3	87	4	68	15	506	3	48
2 " abandoned	17	479	1	17	6	203	1	31	3	87	4	68	15	506	3	48
1½ " laid	4	68	3	91	23	589	6	130	8	219	2	107	124	3,251	16	370
1½ " abandoned	10	349	7	162	2	38	6	145	13	230	3	50	132	3,638	12	325
1¼ " laid	3	48	7	162	2	38	6	145	13	230	3	50	132	3,638	12	325
1¼ " abandoned	74	1,883	7	162	2	38	6	145	13	230	3	50	132	3,638	12	325
1 " laid	13	278	7	216	2	44	2	56	2	56	2	56	16	370	16	370
1 " abandoned	29	659	7	216	2	44	2	56	2	56	2	56	16	370	16	370
¾ " laid	7	181	1	64	2	56	2	56	2	56	2	56	16	370	16	370
¾ " abandoned	7	181	1	64	2	56	2	56	2	56	2	56	16	370	16	370

8-inch laid	134	2,325	138	3,091	138	3,729	728	14,705	673	15,344	382	8,437	157	3,452	2,350	51,083
8 " abandoned	143	3,031	18	296	14	201	69	1,972	21	420	10	148	4	102	279	6,170
8 " "	1	. . . .	4	99	2	70	74	910	5	123	. . . .	. . . .	. . . .	. . . .	86	1,202
Total laid	315	7,110	159	3,653	148	4,039	842	18,150	691	15,817	414	9,113	165	3,733	2,734	61,615
Total abandoned	181	3,834	23	407	18	389	147	2,976	26	543	12	172	4	102	411	8,423
Net increase	134	3,276	136	3,246	130	3,650	695	15,174	665	15,274	402	8,941	161	3,631	2,323	53,192

**Statement of Location, Size, and Number of Feet of Pipe
Laid during the Year ending January 31, 1896.**

NOTE. — B., indicates Boston; S. B., South Boston; E. B., East Boston; Rox., Roxbury; Dor., Dorchester; W. R., West Roxbury; Bri., Brighton; Brk., Brookline; Chn., Charlestown.

In what Street.	Between what Streets.	District.	Size.	Length.
Huntington ave. . . .	Muddy river and Heath st.		48-in.	325
Brookline (Town) . .	At Muddy river		"	16
Brookline (Town) (contract)	Fisher ave. and Muddy river		"	7,949
	Total 48-inch			8,290
Huntington ave. . . .	Brookline line and Boston Common		42-in.	6,292
Huntington ave. (contract)	" " " " "		"	9,186
	Total 42-inch			15,478
Muddy river . . . . .	. . . . .		36-in.	40
Ruthven st.	Walnut ave. and Elm Hill ave.	Rox.	"	2,000
Heath st.	Huntington ave. and R.R. crossing	"	"	4,600
	Total 36-inch			6,640
Boston Common . . . . .	. . . . .	B.	30-in.	835
Dorchester ave. and D st.	Andrew sq. and Congress st.	S. B.	"	7,538
	Total 30-inch			8,373
At Parker and Heath sts. . . . .	. . . . .	Rox.	24-in.	185
Congress st.	D st. and B st.	So. B.	"	523
	Total 24-inch			708
Huntington ave. . . .	Francis and Wait sts.	Rox.	20-in.	80
Boston Common . . . . .	. . . . .	B.	"	50
Harvard ave.	Brighton ave. and Brookline line	Bri.	"	1,652
Centre st.	Harvard st. and Winchester st.	Brk.	"	48
	Total 20-inch			1,880
New Commonwealth ave.	Foster st. and Chestnut Hill ave.	Bri.	16-in.	1,545
West st.	Tremont and Washington sts.	B.	"	450
Boston Common . . . . .	. . . . .	"	"	470
	Carried forward			2,465

Statement of Location, Size, etc. — *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i>			2,465
Park st.	Tremont and Beacon sts.	B.	16-in.	291
Talbot ave.	Bernard and Westcott	Dor.	"	60
" "	Colonial and Southern ave.	"	"	205
Heath st.		Rox.	"	20
	Total 16-inch			3,041
Congress st.	Off Federal st.	B.	12-in.	86
Travers st.	Charlestown and Merrimac sts.	"	"	998
Endicott st.	Hanover and Causeway sts.	"	"	1,841
Federal st.	Essex st. and No. 318	"	"	683
Bellflower st.	Boston st. and Dorchester ave.	So. B.	"	24
Byron st.		E. B.	"	60
Marginal st.		"	"	418
Towers st.	Montmorenci st. and Orient ave.	"	"	39
Beachmont ave.		"	"	96
Elm Hill ave.	Howland and Crawford sts.	Rox.	"	204
Beacon st.	South side of bridge	"	"	230
Beacon st.	Deerfield st. and R.R. bridge	"	"	742
Delaware st.	From Tremont st.	"	"	144
Seaver st.	Blue Hill ave. and Maple st.	"	"	875
St. Alphonsus st.	Longwood ave. and Ward st.	"	"	15
Audubon road		"	"	81
Parker Hill ave.	Hillside st. and Huntington ave.	"	"	152
Lawn st.	Hayden and Heath sts.	"	"	380
Rogers ave.	Ruggles st. and Bay View place	"	"	311
Shawmut ave.	Rutland and West Newton st.	"	"	250
West Selden st.		Dor.	"	36
Park st.	Washington and Waldeck sts.	"	"	36
Romsey st.	From Sagamore st.	"	"	52
" "	" " "	"	"	48
Groveland st.	" River st.	"	"	502
Dorchester ave.	Templeton and Edwin sts.	"	"	229
Oakland st.	Rockville and Rockdale sts.	"	"	45
" "	Rockdale st. and Blue Hill ave.	"	"	522
" "	Opposite Rockdale st.	"	"	8
	<i>Carried forward</i>			9,107

Statement of Location, Size, etc. — *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i>			9,107
Glenway st.	Blue Hill ave. and Erie st.	Dor.	12-in.	205
“ “	Fowler and White sts.	“	“	630
Bakersfield st.	Morrill and Stoughton sts.	“	“	132
“ “	“ “ “ “	“	“	75
Topliff st.	Bowdoin and Stonehurst sts.	“	“	157
Lonsdale st.	Dorchester ave. and Adams st.	“	“	1,693
Kilton st.	North of Harvard st.	“	“	640
“ “	West Park and Harvard sts.	“	“	418
Harvard st.	Kilton st. and Standish ave.	“	“	282
Blue Hill ave.	River st. and Fremont st.	“	“	36
“ “	Devon st. and Intervale	“	“	427
Edson st.	Norfolk st. and Milton ave.	“	“	123
Barrington st.	Stonehurst and Speedwell sts.	“	“	36
“ “	“ “ “ “	“	“	130
Roseclair st.	From Dorchester ave.	“	“	523
Capen st.	Greenhill and Preston st.	“	“	418
“ “	From Freeport st.	“	“	236
Geneva ave.	Blue Hill ave. and Wilder st.	“	“	623
Rosewood st.	From Oakland st.	“	“	72
Wells ave.	Dorchester ave. and Railroad	“	“	343
Morton st.	Norfolk st. and R.R. bridge	“	“	60
Willowwood st.	“ “ Ballou ave.	“	“	244
Ballou ave.	Willowwood and Mountain ave.	“	“	171
Mountain ave.	Ballou ave. and Lauriat ave.	“	“	629
Columbia st.	Wales pl. and Richfield st.	“	“	778
Centre st.	Montclair ave., toward Farquhar st.	W. R.	“	216
Baker st.	Baker pl. and Mt. Vernon st.	“	“	811
“ “	Spring st. and Hart st.	“	“	305
South st.	Walkhill st. and Bussey-park entrance	“	“	1,622
Centre st.	Farquhar st. and South st.	“	“	253
Canterbury st.	From Blue Hill ave. and Angell st.	“	“	580
Washington st.	Corner Hyde Park ave.	“	“	100
“ “	LaGrange and Heron sts.	“	“	814
“ “	Morton and Stony Brook sts.	“	“	332
	<i>Carried forward</i>			23,241

Statement of Location, Size, etc. — *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i>			23,241
Washington st.	At Forest Hills Station	W. R.	12-in.	332
Beech st.	Belgrade and Aldrich sts.	"	"	150
Poplar st.	Dale and James sts.	"	"	128
Catalpa st.	Perkins and Castleton sts.	"	"	233
" "	Perkins st., across Castleton st.	"	"	442
Lockstead ave.	Centre st. and Jamaica way	"	"	974
Castleton st.	Parkway and Catalpa st.	"	"	696
Neponset ave.	Canterbury and Jewett sts.	"	"	744
Mt. Vernon st.	Corner of Baker st.	"	"	72
Walker st.	From Weld st.	"	"	338
Williams st.	Washington and Plainfield sts.	"	"	395
Bellevue ave.	South of Cornell st.	"	"	262
Park Driveway	Washington st. and Railroad	"	"	324
Litchfield st.	From Lincoln st.	Bri.	"	264
Bigelow st.	Dunboy and High sts.	"	"	300
" "	" " " "	"	"	145
Corey road	Winsor road and Washington st.	"	"	521
" "	Summit ave. and Warren st.	"	"	157
Nonantum st.	Washington st. and Newton line	"	"	388
Faneuil st.	Parsons and Hobart sts.	"	"	120
Oakland st.	Washington and Faneuil sts.	"	"	400
Commonwealth ave.	Brighton ave. and Harvard ave.	"	"	498
	Total 12-inch			<u>31,124</u>
Federal st.	Franklin and Channing sts.	B.	10-in.	154
Capen st.	Norfolk and Dyar sts.	Dor.	"	271
A new st.	Off South st.	W. R.	"	280
" " "	" " "	"	"	169
Walker st.	" Weld st.	"	"	658
Washington st.	At Forest Hills Station	"	"	30
	Total 10-inch			<u>1,562</u>
Lincoln st.	Essex and Tufts sts.	B.	8-in.	158
Montmorenci ave.	Tower st. and Orient ave.	E. B.	"	120
Farrington st.	From Orient ave.	"	"	96
	<i>Carried forward</i>			374

Statement of Location, Size, etc. — *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i>			374
Rawson st.	Dorchester ave. and Boston st.	So. B.	8-in.	96
Kingsbury st.	Washington and Bainbridge sts.	Rox.	"	43
Hutchins st.	Elm Hill ave. and Humboldt ave.	"	"	150
Granby st.	Bay State road and Commonwealth ave.	"	"	281
Huntington ave.	Cor. of Calumet st.	"	"	43
Weston st.	Cabot and Warwick st.	"	"	84
Sherborn st.	Commonwealth ave. and Bay State road	"	"	310
Mt. Vernon st.	Buttonwood st. and Von Hillern	Dor.	"	220
Fuller st.	Morton and Capen sts.	"	"	84
Welles ave.	Ocean and Alban sts.	"	"	96
Thane st.	Off West Park st.	"	"	424
Almont st.	From Blue Hill ave.	"	"	200
Waldeck st.	From Lindsey st.	"	"	148
" "	Tremlet Park and Park st.	"	"	192
Phipps ave.	Off Blue Hill ave.	"	"	295
Duncan st.	Greenwick and Fenton sts.	"	"	40
Colonial ave.	New England and Talbot aves.	"	"	954
Speedwell st.	Topliff and Barrington sts.	"	"	755
Holden st.	From Boston st.	"	"	96
Kenwood st.	Washington and Allston sts.	"	"	248
McLellan st.	Erie st. and Page ave.	"	"	345
Northern ave.	Washington and Whitfield sts.	"	"	205
Fowler st.	Glenway st. and Greenwood st.	"	"	896
Greenwood st.	From Fowler st.	"	"	345
Rossiter st.	Bowdoin ave. and Bullard	"	"	228
Eldon st.	Washington st. and Bowdoin ave.	"	"	298
Stanwood st.	Blue Hill ave. and Columbia st.	"	"	862
Chester st.	Rockway and Oakland sts.	"	"	345
Porter st.	Jess and Bismark sts.	W. R.	"	180
Amesbury st.	From Baker st.	"	"	298
Amherst st.	Dudley ave. and Albans st.	"	"	726
Ashland st.	Shelton and Sherwood sts.	"	"	280
Allendale st.	From Centre st.	"	"	1,588
Catalpa st.	Perkins and Castleton sts.	"	"	24
	<i>Carried forward</i>			11,753

Statement of Location, Size, etc. — *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i>			11,753
Clarendon ave.	Hillburn st. and Clarendon park	W. R.	8-in.	160
Farquhar st.	From Centre st.	"	"	4
Farrington st.	Kenneth st. and Anawan ave.	"	"	172
Parkway	At Centre st., near May st.	"	"	40
"	" " "	"	"	48
Proctor st.	Fairview and Walter sts.	"	"	73
South Walter st.	From South st. towards Roberts st.	"	"	107
Tower st.	From Washington st.	"	"	55
Temple st.	Cor. of Mt. Vernon st.	"	"	18
Walter st.	Mendum & Bussey sts.	"	"	948
Aldie st.	Athol and Everett sts.	Bri.	"	321
Allston Terrace	From Hobart st.	"	"	156
" "	" " "	"	"	188
Brighton ave.	Cambridge st. and Commonwealth ave.	"	"	3,538
Commonwealth ave.	Harvard ave. and Brighton ave.	"	"	468
Elmira st.	Murdock and George sts.	"	"	212
Hobart st.	Faneuil st. and Allston terrace	"	"	263
Malvern st.	From Brighton ave.	"	"	22
Ridgemont st.	From Eleanor st.	"	"	28
Summit ave.	Corey road and Allston st.	"	"	90
	Total 8-inch			<u>18,664</u>
Chauncy st.	Bedford and Summer sts.	B.	6-in.	116
Essex pl.	Essex and Tufts sts.	"	"	73
" "	" " " "	"	"	67
Farnsworth st.	Off Congress st.	"	"	100
Lewis st.	North and Moon sts.	"	"	105
Milk st.	Hawley st. and Sewall pl.	"	"	21
Norway st.	Falmouth and St. Paul sts.	"	"	161
Powers court	Off North st.	"	"	192
Strong pl.	Off Cambridge st.	"	"	144
Whitmore st.	Kneeland and Harvard sts.	"	"	82
H st.	Broadway and Fourth st.	S. B.	"	293
N st.	" " Second st.	"	"	156
	<i>Carried forward</i>			<u>1,510</u>

Statement of Location, Size, etc. — *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i>			1,510
Story st.	G and H sts.	B.	6-in.	211
Everett pl.	Off Everett st.	E.B.	"	115
Homer st.	Moore and Byron sts.	"	"	27
Meridian st.	West Eagle and Falcon sts.	"	"	117
Shelby st.	Lexington and Princeton sts.	"	"	247
Aspen st.	Montrose and Copeland sts.	Rox.	"	187
Abbotsford st.	Walnut ave. and Harold st.	"	"	627
Beacon st.	Bay State road and Raleigh st.	"	"	390
" "	At Audubon circle	"	"	145
Bay State road	Sherburn and Granby sts.	"	"	740
" " "	Granby and Ashby sts.	"	"	60
Burney st.	Tremont st. and Delle ave.	"	"	131
Brunswick st.	Blue Hill ave. and Warren st.	"	"	467
Cardington st.	Off Cobden st.	"	"	208
Cherokee st.	Hillside and Pontiac sts.	"	"	216
Danube st.	Brookford and Dewey sts.	"	"	36
Duncan st.	Ruggles and Halleck sts.	"	"	606
Eldora st.	Hillside and Sunside sts.	"	"	170
Fisher ave.	At Lawn st.	"	"	48
Flagg st.	Off Washington st.	"	"	227
Fairweather st.	Off Harrison ave.	"	"	150
Fenno st.	Rockland st. and Buena Vista ave.	"	"	172
Hammett st.	Weston and Sarsfield sts.	"	"	50
Heath ave.	Heath pl. and Heath st.	"	"	60
" "	" " " " " "	"	"	125
Lansdowne st.	Off Massachusetts ave.	"	"	147
Logan st.	Off Lambert ave.	"	"	147
Oswald st.	Calumet and Hillside sts.	"	"	341
Penryth st.	Centre and Pyncheon sts.	"	"	43
Prentiss-st. pl.	Off Linden Park st.	"	"	234
Rockledge st.	Off Lambert ave.	"	"	196
Rogers ave.	Near Ruggles st.	"	"	29
Sudbury pl.	Off Weston st.	"	"	202
Stanmore pl.	Off Warren st.	"	"	27
	<i>Carried forward</i>			8,408

Statement of Location, Size, etc. — *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i>			8,408
St. Botolph st.	Massachusetts ave. and Gainsboro' st.	Rox.	6-in.	555
Wait st.	Hillside st. and Huntington ave.	"	"	96
Willow court	Off Shawmut ave.	"	"	200
Arcadia terrace	Off Arcadia st.	Dor.	"	48
Adams terrace	Adams st. to Muzzey terrace	"	"	388
Auckland st.	Towards Dorchester	"	"	112
Belfort st.	Off Dorchester ave.	"	"	308
Burbank st.	Washington and Merrill sts.	"	"	364
Branch ave.	Ditson and Arcadia sts.	"	"	125
" "	" " " "	"	"	215
Baker pl.	Off East Cottage st.	"	"	271
Bruce st.	Wrentham and Ashmont sts.	"	"	252
Balfour st.	Wayland and Dalkeith sts.	"	"	132
Cunningham terrace	Off Hartford st.	"	"	167
Cottage terrace	From East Cottage st.	"	"	313
" "	Marshfield and East Cottage sts.	"	"	123
Chamberlain st.	Algonquin and Harvard sts.	"	"	65
Cook st.	Washington and Chamberlain sts.	"	"	71
Clifton park	Dudley st. and Clifton st.	"	"	102
Centre court	Off Centre st.	"	"	228
Dorchester ave.	Wrentham and Templeton sts.	"	"	216
Dunbar ave.	Off Washington st.	"	"	133
Devon st.	Off Blue Hill ave.	"	"	464
Evandale terrace	From Savin Hill ave.	"	"	94
Grace st.	From Walton st.	"	"	196
Glenmore st.	Groveland and Standard sts.	"	"	42
Hunter st.	Off Morton st.	"	"	222
Howe st.	Off Hancock st.	"	"	96
Lyon st.	Dorchester ave. and Adams st.	"	"	206
Leeds st.	From Savin Hill ave.	"	"	36
Letterfine terrace	Off Howard ave.	"	"	186
Milton st.	From Granite ave.	"	"	202
Mascot ave.	From Mountain ave.	"	"	698
Mellen st.	Ocean and Alban sts.	"	"	190
	<i>Carried forward</i>			15,529

Statement of Location, Size, etc. — *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i>			15,529
Mt. Bowdoin Green . .	Bowdoin ave. and Bowdoin ave.	Dor.	6-in.	96
Merrill st.	Perry and Glenarm sts.	"	"	15
Morrill st.	Pleasant and Bakersfield sts.	"	"	17
Millet st.	Off Harvard st. (north side)	"	"	633
Middleton ave.	From Norfolk st.	"	"	257
Muzzey terrace	Off King st.	"	"	305
Newhall ave.	Newhall st. and Adams st.	"	"	186
Newhall st.	Newhall ave. and Pierce ave.	"	"	190
Newhall pl.	Off Newhall ave.	"	"	184
Norton st.	Stonehurst and Bowdoin sts.	"	"	76
" "	" " " "	"	"	141
" "	Speedwell and Stonehurst sts.	"	"	100
Neponset ave.	No. and So. Munroe terrace	"	"	138
Nottingham st.	From Bowdoin ave.	"	"	36
Oleander st.	Alexander ave. and Bird st.	"	"	385
" "	Oleander and Alexander ave.	"	"	20
Page ave.	McLellan ave. and Glenway st.	"	"	439
Rockdale st.	Off Oakland st.	"	"	276
Rosedale st.	Washington and Whitfield sts.	"	"	364
Rockway st.	Rockville st. and Chester st.	"	"	295
Stonehurst st.	Topliff and Barrington sts.	"	"	642
" "	Norton and Barrington sts.	"	"	156
Standard st.	River st. and Manchester st.	"	"	739
Sagamore st.	Belfort and Romsey sts.	"	"	144
Sewall st.	Neponset ave. and Pope's Hill st.	"	"	316
Salcombe st.	Stoughton and Cushing ave.	"	"	144
Street off Wells ave. .	Dorchester ave. and railroad crossing . .	"	"	45
Train st.	Mill st. and King st.	"	"	132
Trowbridge court . .	Off Faulkner st.	"	"	41
Vaughn st.	Harvard st. and Blue Hill ave.	"	"	303
Vinson st.	Marlowe st. and Geneva ave.	"	"	132
Whitfield st.	Wheatland ave. and Talbot ave.	"	"	155
" "	Clarence place and W. Park st.	"	"	127
Walton st.	Harley and Washington sts.	"	"	396
	<i>Carried forward</i>			23,154

Statement of Location, Size, etc.—Continued.

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i>			23,154
Wayland st.	Off Howard ave.	"	6-in.	478
Willowwood st. . . .	From Ballou ave.	"	"	7
Allen st.	Rowe st. and Brown ave.	W.R.	"	90
Argyle st.	Off Cornwall st.	"	"	214
Berwick st.	Off Baker st.	"	"	421
Bishop st.	Everett and Call sts.	"	"	166
Cranston st.	Off Sheridan st.	"	"	263
Cable st.	Menton and Merriam sts.	"	"	283
Clifton st.	Albano and Norfolk sts.	"	"	70
" "	" " Kittredge sts.	"	"	225
Egleston st.	School and Boylston sts.	"	"	122
Folsom st.	Mt. Hope and Neponset ave.	"	"	115
Glines ave.	Off School st.	"	"	198
Georgianna st.	Off Boylston st.	"	"	194
Hall st.	South and Call sts.	"	"	36
Jones st.	Fairview and Walter sts.	"	"	148
Lamartine st.	Bell and Green sts.	"	"	247
Metropolitan ave. . . .	Off Washington st. (right side)	"	"	48
Merriam st.	Brookside ave. and Stony Brook	"	"	250
Minton st.	" " " " "	"	"	219
Mozart st.	Selwyn and Walter sts.	"	"	24
Maybury terrace . . .	Off Amory st.	"	"	273
(New street)	Rowe st. and Railroad	"	"	203
Ophir st.	Washington st. and Brookside	"	"	340
Perham st.	Winslow and Mt. Vernon sts.	"	"	252
Pleasant st.	LaGrange and " " "	"	"	386
Paul Gore st.	Danforth and Lamartine sts.	"	"	27
Rexham st.	Off Palgrade ave.	"	"	230
Rowe st.	Ashland st. and Allen st.	"	"	113
Spruce st.	Florence and Bourne sts.	"	"	83
Sylvia st.	Washington st. and Forest Hills st. . . .	"	"	142
Tafts pl.	Off South st.	"	"	48
Woodside ave.	Washington st. and Forest Hills st. . . .	"	"	165
Zamora st.	Off Castleton st.	"	"	39
	<i>Carried forward</i>			29,273

Statement of Location, Size, etc. — *Concluded.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i>			29,273
Bayard st.	Kenneth st. and N. Harvard st.	Bri.	6-in.	145
Brentwood st.	Athol st. and Appian way	"	"	233
Cypress road	Murdock and Etna sts.	"	"	133
Etna st.	Cypress road and Spring st.	"	"	174
" "	" " " Elmira st.	"	"	132
Linden st.	Harvard ave. and Reedsdale st.	"	"	16
Maple ave.	Elmira st. and Garden st.	"	"	266
Mapleton st.	Market and Murdock sts.	"	"	178
Peaceable st.	Winship and Rockland sts.	"	"	56
Quint-ave. Extension .	Off Brighton ave.	"	"	12
Boston Harbor	Between Long and Galloupe's Islands		"	4,068
" "	" " " Moon Islands		"	3,336
" "	On Long Island		"	400
" "	" Moon "		"	30
" "	" Galloupe's Island		"	685
	Total 6-inch			39,137
" "	Moon to Long Island		2-in.	3,745

Statement of Pipes Abandoned.

In what Street.	Between what Streets.	District.	Size.	Length, in.
(New) Commonwealth ave.	South and Foster sts.	Bri.	12-in.	565
Cove st.	Cove place and Furnace sts.	B.	8-in.	255
Furnace st.	" " " Cove st.	"	"	65
Endicott st.	Hanover st. and Charlestown	"	6-in.	1,841
Park st.	Tremont and Beacon sts.	"	"	291
Revere st.	Irving and South Russell sts.	"	"	100
Shawmut ave.	Rutland and West Newton sts.	"	"	250
Travers st.	Charlestown and Merrimac sts.	"	"	998
West st.	Washington and Tremont sts.	"	"	450
Swan st.	Dorchester ave. and Colony st.	So. B.	"	382
Duncan st.	Ruggles and Halleck sts.	Rox.	"	264
Long Island . . . . .	. . . . .	"	"	200
Linden st. . . . .	. . . . .	"	"	410
Spruce st.	Florence and Bourne sts.	W. R.	"	83
Galloupe's Island . . . . .	. . . . .	"	"	660
Baxter st.	Off D st.	So. B.	4-in.	134
Colony st.	Swan and Foundry sts.	"	"	496
Ontario st.	" " " "	"	"	496
Flagg st.	Off Washington st.	Rox.	"	252
Knight's court	Off Oakdale st.	W. R.	"	24
Long to Galloupe's Island. . . . .	. . . . .	"	"	4,068
Willow court	Off Shawmut ave.	Rox.	3-in.	200

Statement of Pipes Abandoned on the J. P. A. System.

In what Street.	Between what Streets.	District.	Size.	Length.
Ruggles st.	Cabot and Tremont sts.	Rox.	8-in.	420
Cary st.	Riverside and Terry st.	"	6-in.	153
Parker st.	Huntington ave. and Rogers ave.	"	"	450
Culvert st.	Cabot and Hampshire sts.	"	4-in.	184
Hampshire st.	Ruggles st. and Linden park	"	"	1,400
Simmons st.	Linden Park and Vernon st.	"	"	300
Vernon st.	Lamont and Tremont sts.	"	"	300
Sumner st.	Off Cabot st.	"	3-in.	190
Simmons st.	Linden Park and Vernon st.	"	"	320
Vernon st.	Lamont and Tremont sts.	"	"	220

Statement of Pipes Lowered.

In what Street.	Between what Streets.	District.	Size.	Length.
Washington st.	Oak. sq. and Brook's lane	Bri.	12-in.	300
Chester st.	Rockway and Oakland sts.	Dor.	8-in.	96
Middleton ave.	Off Norfolk st.	"	6-in.	36
Spruce st.	Florence and Bourne sts.	W. R.	"	189

Cochituate Meters Applied.

	DIAMETER IN INCHES.							Totals.
	4	3	2	1½	1	¾	⅝	
Ball and Fitts					1			1
Crown	3	6	6	16	19	11	46	107
Gem	1	1						2
Hersey		2	3	4	12	22	3	46
Metropolitan			1	11	10	93		115
Worthington		3	3	5	31	6		48
Totals	4	12	13	36	73	132	49	319

Cochituate Meters Discontinued.

	DIAMETER IN INCHES.								Totals.
	6	4	3	2	1½	1	¾	⅝	
B.W.W.							1		1
Crown		1	3	6	2	3	7	58	80
Gem	1								1
Hersey				1	3		12		16
Metropolitan					2	3	112		117
Worthington			1	2	5	16	9		33
Total	1	1	4	9	12	22	141	58	248

Cochituate Meters Sent to Factory for Repairs.

	DIAMETER IN INCHES.						Totals.
	3	2	1½	1	¾	⅝	
Crown	2	1	1	4	11	68	87
Hersey		2		2	9	4	17
Metropolitan				18	60	1	79
Worthington	1	1	1	27	2		32
Totals	3	4	2	51	82	73	215

Meters Purchased.

	DIAMETER IN INCHES.							Totals.
	4	3	2	1½	1	¾	⅝	
Crown	3	2	9	20	40		25	99
Hersey	1	2	7	5	12	25		52
Metropolitan			3	15		25		43
Worthington		4	5	9		6		24
Totals	4	8	24	49	52	56	25	218

Mystic Meters Applied.

	DIAMETER IN INCHES.							Totals.
	4	3	2	1½	1	¾	⅝	
Crown	1	...	2	...	5	3	4	15
Hersey	1	1	1	...	1	...	...	4
Metropolitan . . . . .	...	...	...	...	4	13	...	17
Worthington . . . . .	...	...	1	...	...	1	...	2
Totals	2	1	4	...	10	17	4	38

Mystic Meters Discontinued.

	DIAMETER IN INCHES.						Totals.
	4	2	1½	1	¾	⅝	
Crown . . . . .	...	2	...	2	1	2	7
Hersey . . . . .	...	2	...	1	...	...	3
Metropolitan . . . . .	...	...	...	3	6	...	9
Worthington	1	...	1	2	4	...	8
Totals	1	4	1	8	11	2	27

Mystic Meters in Service January 31, 1896.

	DIAMETER IN INCHES.								Totals.
	6	4	3	2	1½	1	¾	⅝	
Ball and Fitts . . . . .	...	...	1	...	...	...	...	...	1
Crown	3	9	8	16	2	29	45	98	210
Hersey . . . . .	...	2	4	3	2	9	...	...	20
Metropolitan . . . . .	...	...	...	...	...	23	66	...	89
Worthington . . . . .	...	10	6	40	8	66	49	5	184
Totals	3	21	19	59	12	127	160	103	504

Mystic Meters sent to Factory for Repairs.

	DIAMETER IN INCHES.								Totals.
	6	4	3	2	1½	1	¾	⅝	
Crown	1	6	7
Metropolitan	6	9	...	15
Worthington	1	...	2	6	...	9
Totals	1	...	8	16	6	31

Cochituate Meters in Service January 31, 1896.

	DIAMETER IN INCHES.								Totals.
	6	4	3	2	1½	1	¾	⅝	
Ball and Fitts . . . . .	...	...	...	...	...	1	1	1	3
B. W. W. . . . .	...	...	...	...	...	...	45	...	45
Champion . . . . .	...	...	...	...	...	...	1	...	1
Crown	2	25	38	53	130	279	371	1,180	2,078
Gem . . . . .	...	2	1	...	...	...	...	...	3
Hersey . . . . .	...	2	7	16	27	52	151	17	272
Metropolitan . . . . .	...	...	...	4	14	114	647	3	782
Nash . . . . .	...	...	...	...	...	...	...	1	1
Thompson . . . . .	...	...	...	1	...	1	...	5	7
Worthington	2	12	26	114	100	530	390	32	1,206
Totals	4	41	72	188	271	977	1,606	1,239	4,398

Meters Changed.

CAUSE.	COCHITUATE.	MYSTIC.
Not registering	285	50
For test	488	43
Unsatisfactory	98	14
Stoppage	31	10
Leak at body	19	6
Leak at coupling	26	.....
Leak at spindle	23	.....
Clock broken	16	2
Clock defaced	26	8
Enlargement of service-pipe	42	2
No force	110	3
Frozen	53	4
Meters burst	24	2
Hands off	22	2
Hands loose	16	.....
To relocate	11	1
By mistake	6	.....
Totals	1,296	147

Meters Repaired in Service.

CAUSE.	COCHITUATE.	MYSTIC.
Clock changed — unsatisfactory	156	69
Leak at spindle	76	2
Leak at coupling	18	5
Leak at joint	11	3
Leak at bushing	3	.....
Leak at stop-cock	2	1
Leak on pipe	4	2
Cap broken	2	1
Ratchet	3	1
Gearing adjusted	3	7
Fish-box frozen — burst	1	.....
Repacked meter . . . . .	.....	3
Cleaned fish-box . . . . .	.....	1
Totals	279	95

**General Statement of Meters for the Year ending
January 31, 1896.**

	COCHITUATE.		MYSTIC.	
	Meters.	Boxes.	Meters.	Boxes.
In service January 31, 1896 . . .	4,398	.....	504	.....
New set	319	73	38	11
Discontinued	248	.....	27	.....
Lost in service	6	.....	1	.....
Changed	1,296	.....	147	.....
Changed location	15	.....	3	.....
Tested at shop	2,870	.....	260	.....
Repaired at shop	934	.....	73	.....
Repaired at factory	215	.....	31	.....
Repaired in service	279	53	95	22
Purchased	210	.....	8	.....

Hydrants Established and Abandoned during the Year.

	ESTABLISHED.					ABANDONED.					Increase.
	Lowry.	Post.	B. Lowry.	Boston.	Totals.	Lowry.	Post.	B. Lowry.	Boston.	Totals.	
Boston	8	6	..	1	15	3	..	2	6	11	4
South Boston	7	6	2	1	16	1	1	1	10	13	3
East Boston	1	1	1	..	3	..	..	..	..	..	3
Roxbury	6	32	13	1	52	7	1	2	3	13	39
Dorchester	4	79	35	..	118	1	..	5	2	8	110
West Roxbury	4	41	17	..	62	..	1	6	2	9	53
Brighton . . . . .	..	28	5	..	33	1	1	..	2	4	29
Galloupe's Island . . . . .	..	1	..	..	1	..	..	..	..	..	1
	30	194	73	3	300	13	4	16	25	53	242

Total Number of Hydrants in use January 31, 1896.

	Lowry.	Post.	B. Lowry.	Boston Y.	Boston.	Total.
Boston	704	281	58	1	485	1,528
South Boston	220	102	23		249	595
East Boston	140	104	24		136	404
Roxbury	662	261	77		86	1,086
Dorchester	580	550	226		60	1,416
West Roxbury	129	548	182		44	903
Brighton	78	304	64		22	478
Deer Island		17				17
Brookline	5				3	8
Chelsea					7	7
Quincy		7				7
Long Island		6				6
Thompson's Island		2				2
Rainsford Island					1	1
Galloupe's Island		1				1
	2,518	2,183	654	1	1,103	6,459

Water-Posts.

DISTRICT.	Number in use Jan. 31, 1895.	Established during the year.	Abandoned during the year.	Number in use Jan. 31, 1896.
Boston	48	5		53
South Boston	27	1		28
East Boston	31	1		32
Roxbury	66	3		69
Dorchester	80			80
West Roxbury	67	2		69
Brighton	47			47
	366	12		378

Dead ends blown off	80
Hydrant barrels changed for repairs	146
“ boxes repaired in service	93
“ “ renewed	92
“ nipple put in	8
Hydrants oiled	22
Boxes over bridges repaired	5
Main cocks repaired	35
S.W. cocks repaired	14
New S.W. cocks put on	154
Stop-cock boxes repaired in service	133
“ “ renewed	96
Fire reservoirs repaired	2
Change from low to high — 4-inch and upwards	9
“ “ “ “ “ — 3 “ “ under	37

Repairs of Pipes during the Year ending Jan. 31, 1896.

	DIAMETER OF PIPES IN INCHES.																				Total.	
	48	42	40	36	30	28	24	20	16	12	8	6	4	3	2	1½	1¼	1	¾	½		¼
Boston			2	1	1			2	1	16	6	56	26	4	23	5	1	21	12	440	8	625
South Boston									1	1	1	16	2		8			3	1	197	11	241
East Boston										2	1	4			6	1		1	2	100	8	125
Roxbury				2	1	1	1	1	1	7	1	9	8		12	1	1	2	3	237	19	307
Dorchester										3	3	9		1	5					79	2	102
West Roxbury	1			1			1			6	3	6			2				1	76	1	98
Brighton		1			4				1	1					5					20		32
Deer Island											1	1			1							3
Long Island												1										1
Rainsford Island													1									1
	1	1	2	4	6	1	2	3	4	36	16	102	37	5	62	7	2	27	19	1,149	49	1,535

Causes of repairs that have been made on pipes of 4-inch diameter and upwards :

Defective pipe	11
“ joint	71
“ packing	58
Frozen	10

Carried forward,

150

<i>Brought forward,</i>	150	
Leak at main	4	
Pipe broken by blasting	7	
“ “	8	
Settling of earth	25	
Stop-cock broken	11	
“ leak	8	
Struck by pick	2	
	—	215
On 3-inch and on service-pipes :		
Broken in wall	11	
“ “ sewer	6	
Burst	3	
Defective joint	16	
“ packing	10	
“ pipe	67	
“ stop-cock	12	
Eaten by soil	7	
Frozen	85	
Gnawed by rats	7	
Injured by electricity	1	
Leak at coupling	15	
“ “ joint	17	
“ “ main	9	
“ “ valve	17	
No force	2	
Pipe broken	62	
Settling	235	
Stopped by dirt	40	
“ “ fish	39	
“ “ gasket	17	
“ “ gravel	2	
“ “ rust	557	
“ “ solder	3	
Struck by pick	75	
Valve broken	5	
	—	1,320
		<hr/>
		1,535
		<hr/>

In addition to the above, 331 service-pipes were shut off for repairs inside street line, and notice of the same sent to the On-and-Off Department of the Income Division.

Statement of Leaks and Stoppages, from 1850 to 1895.

YEAR.	DIAMETER IN INCHES.		TOTAL.
	Four inches and upwards.	Less than four inches.	
1850	32	72	104
1851	64	173	237
1852	82	241	323
1853	85	260	345
1854	74	280	354
1855	75	219	294
1856	75	232	307
1857	85	278	363
1858	77	234	311
1859	82	449	531
1860	134	458	592
1861	109	399	508
1862	117	373	490
1863	97	397	494
1864	95	394	489
1865	111	496	607
1866	139	536	675
1867	122	487	609
1868	82	449	531
1869	82	407	489
1870	157	707	864
1871	185	1,380	1,565
1872	188	1,459	1,647
1873	153	1,076	1,229
1874	434	2,160	2,594
1875	203	725	928
1876	214	734	948
1877	109	801	910
1878	213	1,024	1,237
1879	211	995	1,206
1880	135	929	1,064
1881	145	883	1,028
1882	170	1,248	1,418
1883	171	782	953
1884	253	1,127	1,380
1885	111	638	749

Statement of Leaks and Stoppages, from 1850 to 1895.
Concluded.

YEAR.	DIAMETER IN INCHES.		TOTAL.
	Four inches and upwards.	Less than four inches.	
1856	150	725	875
1857	172	869	1,041
1858	216	1,140	1,356
1859	183	849	1,032
1860	180	718	898
1861	194	758	952
1862	212	1,232	1,444
1863	327	1,555	1,882
1864	349	1,354	1,703
1865	215	1,320	1,535

YARDS.

City Proper. — Albany Street. — The yard and buildings are in good condition. During the year the outside of all the buildings has been painted, also the fences, gates, etc., the roofs repaired, weather-boards renewed, the grounds have been filled in with ashes and cracked stone, the horse-stalls in stable repaired, steam-boilers and elevators inspected by the proper authorities, and the heating-apparatus has been overhauled and put in first-class condition.

The coming year some additional machinery will be needed for our machine shop, as the manufacture of gates, hydrants and brass cocks is yearly growing larger.

Dorchester District. — This yard is in good condition and the buildings are nearly new; but very little will be needed the coming year.

West Roxbury. — This yard is in very poor condition, besides being too small. The stable is poor, and we should have a new and better location. I have caused to be hired the past year another small yard and shed nearby for additional room; have also built a fence and gates to enclose this and the old yard, and have painted the same.

East Boston. — This yard and buildings are in fair condition, but will, however, need painting the coming year.

Yours respectfully,

H. C. RICHARDSON,
General Superintendent, Eastern Division, B. W. W.

APPENDIX D.

REPORT OF THE SUPERINTENDENT OF THE
MYSTIC DIVISION.

OFFICE OF SUPERINTENDENT,
CORNER MEDFORD AND TUFTS STREETS,
BOSTON, February 1, 1896.

HON. JOHN R. MURPHY,
Water Commissioner:

SIR: The annual report of the Mystic Division of the Boston Water Department is herewith submitted.

MYSTIC LAKE.

Mystic lake rose to its highest point, 6.84, on May 10, and then fell until October 12, when it reached its lowest point in the year, 2.17. At this time an abnormally heavy rain of over seven inches caused it to rise four feet.

Water was wasted over the dam from January 11 to February 9, from March 8 to May 29, and again from October 15 to January 1, excepting a few days.

The rainfall on the Mystic water-shed for the past twelve months was as follows:

February	.	.	0.655	August	.	.	5.435
March	.	.	3.000	September	.	.	2.040
April	.	.	4.185	October	.	.	10.195
May	.	.	3.150	November	.	.	6.260
June	.	.	3.630	December	.	.	2.300
July	.	.	4.345	January	.	.	2.355
Total	.	.	.	.	.	.	47.550

Due attention was given to clearing the ponds and streams of algæ and other contaminating matter. Owing to the unusual quantity of water, less trouble was experienced than in former years.

RESERVOIR.

The three gates — 30, 24, and 16-inch in the delivery-gate chamber — were repaired, new valve-rods were substituted

and the gearing rearranged, the old 10 to 1 gears being replaced by gears 4 to 1, thus greatly facilitating the operation of the gates. Also, slight repairs were made at the gate-house.

The roads, walks, and slopes received the usual attention.

CONDUIT.

The following improvements recommended in my last report — the replacing of the wooden sills with stone and the renewing of the grooves for the screens in the pipe-chamber — were made.

A 30-inch gate is being made for the blow-off, and will be placed in position in a few weeks. One of the gates in the gate-chamber, that regulate the passage of the water from the receiving-chamber to the conduit, was overhauled and thoroughly repaired.

The conduit was cleaned and flushed several times during the year.

PUMPING-STATION.

To conduct water to the pump-well connected with the new pump, 178 feet of 36-inch main were laid, with one gate and brick gate-chamber. From the pump, 187 feet of 30-inch force main were laid, with one check-valve and 3 gates; and 4 brick chambers were built, one for the check-valve and one for each of the gates.

To the sewer were run, from pumps Nos. 1, 2, and 3, 172 feet of 12-inch pipe; from the pump-well, 78 feet of 6-inch; and from the cellar, 50 feet of 6-inch.

In the fire-room, about 30 feet of 6-inch pipe were laid; a brick manhole was built, and the brick-work around the boilers repaired.

MYSTIC VALLEY SEWER.

The Mystic Valley sewer and pumping-station were transferred to the State authorities on July 18, and about $2\frac{1}{2}$ miles of the sewer are used as a branch of the metropolitan system, but the pumping plant is discontinued. The amount of sewage pumped from January 31, 1895, to the time of abandonment was 56,723,713 gallons, to which was applied as a precipitant 117,815 pounds of crude sulphate of alumina. The sludge pumped was 1,546,757 gallons, or $2\frac{7}{10}$ per cent. of the sewage. The alumina was applied at the rate of 1 part alumina to 4,012 parts sewerage, or at the rate of 1.038 tons per 1,000,000 gallons of sewage. The amount of coal used was 90.16 tons.

This plant was completed in 1887 and required the services of about 14 men to operate it. Its transfer and discontinuance removes from this department an annual expense of about \$20,000.

WATER SOURCES.

There is a decided improvement in the conditions along the sources of the supply.

Since the construction of the trunk line of the metropolitan sewer through this section and the subsequent construction of the local systems along the line, a number of important cases of pollution have been disposed of.

In Woburn, 10.5 miles of the local system are constructed to date; in Winchester, 10.25 miles; and in Stoneham, preparations are being made to commence its system in the spring.

The glue-work of Baeder, Adamson, & Co., in Woburn, which was the largest pollution case on the supply, was connected with the metropolitan sewer on November 14. In Winchester, Waldmyer's tannery, a large stable, and eleven dwelling-houses, a long-standing nuisance, were demolished in the fall. This property was situated along the banks of the Abajonna river, in the tract of land proposed for a public park. During the past season, 17 per cent. of the recorded cases of pollution were remedied, and in the coming year probably 50 per cent. of the remaining number will be removed.

The following is a summary of the report of Mr. John S. Concannon, Chief Inspector: Present number of cases, 528; of these there are, present safe, 431; seem safe, 32; suspected, 18; unsatisfactory, 47.

Nine new cases were discovered and 108 cases remedied. Thirty legal notices were sent.

SEWAGE TREATMENT AT STONEHAM.

The chemical treatment of sewage at Tidd's tannery was continued the past year and very satisfactory results were obtained.

The quantity of sewage pumped was 4,990,924 gallons, to which was applied as a precipitant 71,360 pounds of sulphate of alumina.

The quantity of sludge pumped was 648,820 gallons, or 13 per cent. of the sewage. This sludge was disposed of by the firm to neighboring farmers, who carted it away for fertilizing purposes. The pulleys and the submerged pumps

received slight repairs and new belts were supplied during the year.

At Fitzgerald's tannery, the amount of sewage increased to 10,000 gallons daily in August, so instead of depending upon the lime from the beam-house as a precipitant, additional chemical was applied.

The owner constructed a vat for the chemical, and this department furnished and applied sulphate of alumina.

The quantity of alumina applied to date was 10,520 pounds, and the effluent is much more satisfactory than formerly.

DISTRIBUTION-PIPES.

The distribution-pipes have been extended by the addition of 452 feet of 4-inch pipe, 17,618 feet of 6-inch pipe, 4,051 feet of 8-inch pipe, 1,061 feet of 10-inch pipe, 2,176 feet of 12-inch pipe, 187 feet of 30-inch pipe, 178 feet of 36-inch pipe. Thirty-nine thousand one hundred and ninety-nine feet of pipe were relaid.

There now remains in Charlestown 8,260 feet of cement-lined pipe, varying in size from 2 to 20 inches.

The work rendered necessary by the abolition of grade crossings between the Chelsea bridges, and referred to in my last report, was completed this fall.

HYDRANTS AND GATES.

Ninety-seven new hydrants, 2 street Lowry hydrants, and 95 Post hydrants, were established. One Post hydrant was replaced by a street Lowry hydrant. Five street Lowry hydrants were repaired, and eight Lowry hydrant barrels were replaced with longer ones. One hundred and ninety-eight gates were established, — two 3-inch, fifteen 4-inch, one hundred and twenty 6-inch, twenty-three 8-inch, thirteen 10-inch, twenty 12-inch, one 24-inch, three 30-inch, and one 36-inch. There were abandoned four 3-inch, thirty 4-inch, ten 6-inch, seven 8-inch.

Six hydrant-boxes and thirty gate-boxes were replaced by new ones.

FOUNTAINS AND STANDPIPES.

Three new drinking-fountains were established, and one abandoned. Ten new standpipes were erected for street-watering.

SERVICE-PIPES.

Eight hundred and sixty-three new services were laid, distributed as follows: Charlestown, 39; Chelsea, 130;

Everett, 265; Somerville, 429, — for which 20,524 feet of pipe were required.

Two hundred and thirty-four services were repaired. Thirteen services were removed and larger ones substituted.

Seventeen stop-cock boxes were replaced by new ones. Thirty-six stoppages by eels, four by rust, and eight by moss were forced out.

New Services.

Size	$\frac{1}{2}$ -in.	$\frac{3}{8}$ -in.	$\frac{1}{4}$ -in.	1-in.	$1\frac{1}{4}$ -in.	$1\frac{1}{2}$ -in.	2-in.	4-in.	6-in.	Total.	Total ft.
Charlestown ..		15	18	1			2	2	1	39	1,102
Chelsea	29	92	7	2						130	4,511
Everett		262		3						265	5,763
Somerville			421	4	2	1			1	429	9,148
Totals	29	369	446	10	2	1	2	2	2	863	20,524

Summary of Services, February 1, 1896.

	Charlestown.	Chelsea.	Everett.	Somerville.	Totals.
Number of services	6,182	5,739	3,554	8,644	24,119
“ “ feet	165,130	155,468	71,206	283,215	675,019

Breaks and Leaks on Distribution-Pipes.

Size	2-in.	3-in.	4-in.	6-in.	8-in.	10-in.	Totals.
Charlestown	2	1	...	1	1	...	5
Chelsea . . . . .	...	3	21	7	1	6	38
Everett . . . . .	...	...	7	6	3	...	16
Somerville	2	...	15	15	2	...	34
Totals	4	4	43	29	7	6	93

Distribution-Pipes Relaid.

LOCATIONS.	Original Size.	4-in.	6-in.	8-in.	10-in.	12-in.	24-in.	30-in.	Totals.
Charlestown :									
Mishawum st. .	4-in.	...	200	....	....	....	....	....	200
Foss st.	4-in.	...	348	....	....	....	....	....	348
Joiner st. . . .	4-in.	...	....	....	....	277	....	....	277
Water st. . . .	8-in.	...	....	....	....	125	....	....	125
Chelsea st. . .	16 & 24 in.	...	....	....	....	....	684	541	1,225
Chelsea :									
Fourth st. . . .	4-in.	...	150	....	....	....	....	....	150
Central ave. . .	{ 300 6-in. 240 10-in. 6 & 10 in. }	{ . . . }	....	....	540	....	....	....	540
Shurtleff st. . .	10-in.	...	....	....	1,300	....	....	....	1,300
Medford st. . . .	4-in.	...	550	....	....	....	....	....	550
Tremont st. . .	{ 270 3-in. 440 4-in. }	{ . . . }	710	....	....	....	....	....	710
Cary ave.	10-in.	...	....	....	949	....	....	....	949
Broadway	10-in.	...	....	....	1,100	....	....	....	1,100
Eleanor st. . . .	4-in.	...	225	....	....	....	....	....	225
Nichols st. . . .	8-in.	...	....	825	....	....	....	....	825
Shawmut st. . .	4-in.	...	....	....	2,070	....	....	....	2,070
Central ave. . . .	6-in.	...	....	950	....	....	....	....	950
Eastern ave. . .	8-in.	...	....	....	573	....	....	....	573
Williams st. . .	8-in.	...	....	....	1,510	....	....	....	1,510
Alford st.	10-in.	...	....	....	26	....	....	....	26
Arlington ave. .	4-in.	...	....	2,200	....	....	....	....	2,200
Marginal st. . .	4-in.	...	....	....	940	....	....	....	940
Everett :									
Waverley ave. .	2-in.	...	36	....	....	....	....	....	36
Vine st.	6-in.	...	60	....	....	....	....	....	60
Broadway	10-in.	...	60	....	....	....	2,485	....	2,545
Somerville :									
Austin st.	6-in.	...	....	70	....	....	....	....	70
Autumn st. . . .	4-in.	...	33	....	....	....	....	....	33
Avon	4-in.	...	6	....	636	....	....	....	642
Beacon st. . . .	{ 1,800 6-in. 90 4-in. }	{ . . . }	15	....	....	1,875	....	....	1,890
Beacon pl. . . .	4 in.	...	20	....	....	....	....	....	20
<i>Carried forward,</i>									
		...	2,413	4,045	9,644	2,277	3,169	541	22,089

Distribution-Pipes Relaid. — *Continued.*

LOCATIONS.	Original Size.	4-in.	6-in.	8-in.	10-in.	12-in.	24-in.	30-in.	Totals.
<i>Brought forward</i>			2,413	4,045	9,644	2,277	3,169	541	22,089
Broadway	8-in.					4,900			4,900
“ {	110 4-in. 15 6-in.	} . .	125						125
Broadway pl.	3-in.	33							33
Church st.	4-in.		616						616
Concord ave.	4-in.					24			24
Cooney st.	4-in.			45					45
Cutter st.	6-in.			18					18
Dickinson st.	8-in.				30				30
Ellsworth st.	4-in.		285						285
Everett ave.	4-in.		874						874
Evergreen ave.	4-in.		8	444					452
Fountain ave.	4-in.		357						357
Florence st.	6-in.			860					860
George st.	4-in.		33						33
Glen st.	6-in.		33						33
Hathon st.	6-in.		10						10
Heath st.	3-in.			1,075					1,075
Homer sq.	4-in.		223						223
Jenny Lind ave.	4-in.		17						17
Kent st.	8-in.					410			410
Kent court	4-in.			298					298
Lincoln st.	8-in.				9				9
Marshall st.	6-in.				33				33
Miller st.	4-in.		14						14
Mystic ave.	6-in.		255						255
Mt. Pleasant st.	6-in.		33						33
Mt. Vernon st.	6-in.				11				11
Nevada ave.	3-in.		269						269
Otis st.	4-in.			885					885
Rush st.	4-in.		33						33
Sacramento st.	6-in.					406			406
Sargent ave.	4-in.		33						33
Shehan st.	4-in.		312						312
<i>Carried forward</i> ,		33	5,943	7,670	9,727	8,017	3,169	541	35,100

Distribution-Pipes Relaid. — Concluded.

LOCATIONS.	Original Size.	4-in.	6-in.	8-in.	10-in.	12-in.	24-in.	30-in.	Totals.
<i>Brought forw'd</i>		33	5,943	7,670	9,727	8,017	3,169	541	35,100
Smith ave. . .	4-in.	. . .	45	. . . . .	. . . . .	. . . . .	. . . . .	. . .	45
Spring st. . . .	4-in.	. . .	765	. . . . .	. . . . .	. . . . .	. . . . .	. . .	765
Summer st. . .	6-in.	. . .	. . . . .	. . . . .	969	. . . . .	. . . . .	. . .	969
Union st. . . .	6-in.	. . .	. . . . .	. . . . .	. . . . .	76	. . . . .	. . .	76
Vernon st. . .	4-in.	. . .	. . . . .	. . . . .	816	. . . . .	. . . . .	. . .	816
Village st. . .	4-in.	. . .	374	. . . . .	. . . . .	. . . . .	. . . . .	. . .	374
Waverley st. .	2-in.	. . .	168	. . . . .	. . . . .	. . . . .	. . . . .	. . .	168
Willow ave. . .	6-in.	. . .	. . . . .	. . . . .	. . . . .	986	. . . . .	. . .	986
Total		33	7,295	7,670	11,512	9,079	3,169	541	39,299

Extension of Distribution-Pipes.

LOCATION.	4-in.	6-in.	8-in.	10-in.	12-in.	30-in.	36-in.	Totals.
Charlestown :								
Mishawum st.		123						123
Medford st.	72							72
Jenner st.			160					160
Pumping-Station						187	178	365
Chelsea :								
Everett ave.		228						228
Cypress st.				252				252
Reynolds ave.		528						528
Vernon st.		272						272
Crescent ave.		100						100
Summit ave.		710						710
Warren ave.		324						324
Everett :								
County ave.		332						332
Malden st.		45						45
Belmont park		293						293
Springvale ave.		432						432
Sea st.		600						600
Elm st.		216						216
Ashton st.		817						817
Union st.		72						72
Calhoun ave.		200						200
Edith st.		580						580
Cleveland ave.		248						248
Garland st.			483					483
Boston st.		260						260
Elm st.		222						222
Myrtle st.		164						164
Highland ave.		220						220
Russell st.		388						388
Gledhill ave.		552						552
Sycamore st.		40						40
Wilbur st.		274						274
Adams ave.		933						933
<i>Carried forward .</i>	72	9,173	643	252		187	178	10,505

Extension of Distribution-Pipes. — *Continued.*

LOCATION.	4-in.	6-in.	8-in.	10-in.	12-in.	30-in.	36-in.	Total.
<i>Brought forward .</i>	72	9,173	643	252	.....	187	178	10,505
Clay	14	.....	.....	.....	.....	.....	14
Jackson st.	485	.....	.....	.....	.....	.....	485
Lexington st.	130	.....	.....	.....	.....	.....	130
Prospect st.	344	.....	.....	.....	.....	.....	344
Harley ave.	170	.....	.....	.....	.....	.....	170
Summit st.	84	.....	.....	.....	.....	.....	84
Vernal st.	713	.....	.....	.....	.....	.....	713
Bradford terrace	412	.....	.....	.....	.....	.....	412
Cedar terrace	226	.....	.....	.....	.....	.....	226
Pleasant ave.	458	.....	.....	.....	.....	.....	458
Broadway	84	.....	.....	.....	84
Jefferson st.	84	.....	.....	.....	.....	.....	84
Winter st.	144	.....	.....	.....	.....	.....	144
Irving st.	60	.....	.....	.....	60
Sts. off Broadway	104	.....	.....	.....	.....	.....	104
Bowdoin st.	20	.....	.....	.....	.....	.....	20
Dana st.	46	.....	.....	.....	.....	.....	46
Washburn st.	46	.....	.....	.....	.....	.....	46
Somerville:								
Austin st.	6	.....	.....	.....	.....	.....	6
Avon st.	446	.....	.....	.....	446
Banks st.	7	535	.....	.....	.....	.....	542
Beacon st.	45	.....	.....	.....	.....	.....	45
Broadway	112	.....	.....	1,155	.....	.....	1,267
Browning road	312	.....	.....	.....	.....	.....	312
Burnside ave.	13	211	.....	.....	.....	.....	224
Chandler st.	38	.....	.....	.....	.....	.....	38
Cherry st.	7	146	.....	.....	.....	.....	153
Church st.	6	.....	.....	.....	.....	.....	6
College ave.	60	.....	.....	.....	.....	60
Craigle court	170	.....	.....	.....	.....	.....	170
Crocker st.	13	569	.....	.....	.....	.....	582
Cross st.	6	.....	.....	.....	.....	.....	6
Derby st.	360	.....	.....	.....	.....	.....	360
Dresden circle	158	.....	.....	.....	.....	.....	.....	158
<i>Carried forward .</i>	230	13,748	2,164	842	1,155	187	178	18,504

Extension of Distribution-Pipes. — *Continued.*

LOCATIONS.	4-in.	6-in.	8-in.	10-in.	12-in.	30-in.	36-in.	Totals.
<i>Brought forward.</i>	230	13,748	2,164	842	1,155	187	178	18,504
Edmunds st.		96						96
Ellsworth st.		7						7
Elm st.					112			112
Elmwood st.			143					143
Everett ave.		18						18
Fairmount ave.	10							10
Fenwick st.		271						271
Fosket st.		6	525					531
Florence st.		12						12
Garfield ave.		72						72
Glen st.		239						239
Gorham st.		16						16
Grant st.		496						496
Harrison st.		239						239
Hawthorne st.		244						244
Heath st.		14						14
Howard st.		208						208
Irving st.			23					23
Jay st.		21						21
Josephine ave.		30						30
Kensington ave.		200						200
Kent st.					322			322
Kent court.	8							8
Lexington ave.		8						8
Lowell st.					587			587
Melvin st.			141					141
Moreland st.		156		200				356
Norwood ave.		263						263
Otis st.		12						12
Partridge ave.		264						264
Professors' row		7	509					516
Richardson terrace	194							194
Shehan st.		5						5
Spring st.		7						7
Summer st.		12						12
<i>Carried forward.</i>	442	16,671	3,505	1,042	2,176	187	178	24,201

Extension of Distribution-Pipes. — *Concluded.*

LOCATION.	4-in.	6-in.	8-in.	10-in.	12-in.	30-in.	36-in.	Totals.
<i>Brought forward .</i>	442	16,671	3,505	1,042	2,176	187	178	24,201
Sycamore st.		183						183
Union st.		6						6
Vernon st.		12		19				31
Waverley st.		5						5
West		235						235
Westwood road		13	523					536
Winslow ave.		28						28
Met. P. Station	10	465						475
Wallace st.			23					23
Total	452	17,618	4,051	1,061	2,176	187	178	25,723

Length of Distributing-Mains connected with Works, February 1, 1896.

DIAMETER.														
	3-in.	4-in.	6-in.	8-in.	10-in.	12-in.	14-in.	16-in.	18-in.	20-in.	24-in.	30-in.	36-in.	Totals.
Charlestown . .	2,436	24,280	66,214	20,986	7,063	15,489	. . . .	17,944	. . . .	6,180	19,178	25,483	1,152	208,405
Chelsea	14,236	46,905	70,029	16,394	34,421	. . . . .	. . . . .	2,348	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	184,383
Everett	788	56,581	83,686	11,936	18,162	1,937	206	2,233	. . . .	2,900	2,485	. . . .	. . . .	180,914
Somerville . . .	5,533	67,896	175,003	54,699	23,922	31,791	8,037	996	387	1,063	. . . .	. . . .	. . . .	369,327
Totals	22,993	195,662	394,932	106,015	83,568	49,217	8,243	23,321	307	10,143	21,663	25,483	1,152	942,979

Number of Gates connected with Works, February 1, 1896.

	12	169	239	60	20	40	. . . . .	25	. . . . .	4	12	15	1	597
Charlestown . .	30	175	120	31	27	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	383
Chelsea	2	158	320	26	37	4	1	4	. . . . .	4	1	. . . . .	. . . . .	597
Everett	4	180	383	74	45	59	. . . . .	2	. . . . .	1	. . . . .	. . . . .	. . . . .	748
Somerville														
Totals	48	682	1,062	191	129	103	1	31	. . . . .	9	13	15	1	2,285

Hydrants Established.

	ESTABLISHED.				Increase.	REMARKS.
	Lowry.	Boston Lowry.	Post.	Flush.		
Charlestown	2	. . . .	1	. . . .	2	1 Post replaced by Lowry.
Chelsea . . . . .	. . . .	. . . .	10	. . . .	10	
Everett . . . . .	. . . .	. . . .	25	. . . .	25	
Somerville . . . . .	. . . .	. . . .	60	. . . .	60	
Totals	2	. . . .	95	. . . .	97	

Hydrants in Use, February 1, 1896.

	Lowry.	Boston Lowry.	Post.	Flush.	Total.	
Charlestown	217	37	74	10	338	
Chelsea . . . . .	. . . .	. . . .	206	4	210	
Everett . . . . .	. . . .	. . . .	282	. . . .	282	
Somerville . . . . .	. . . .	. . . .	702	. . . .	702	
Medford . . . . .	. . . .	. . . .	2	6	8	
Pumping-station . .	. . . .	. . . .	2	1	3	
Totals	217	37	1,268	21	1,543	

Respectfully submitted,

EUGENE S. SULLIVAN,

General Superintendent.

APPENDIX E.

REPORT OF THE ENGINEER.

ENGINEERING DEPARTMENT,
CITY HALL, February 1, 1896.

HON. JOHN R. MURPHY,
Water Commissioner:

SIR: I hereby submit the following report of the work done and records kept during the past year:

SOURCES OF SUPPLY.

The rainfall during the year 1895 was above the average in amount, and the supply of water has been ample at all times.

The rainfall and quantities collected on the several watersheds were as follows:

	Sudbury.	Cochituate.	Mystic.
Rainfall, in inches	50.62	48.96	48.73
Rainfall collected, in inches	24.196	20.172	17.426
Daily average yield of watershed, } in gallons	86,632,900	18,125,934	22,300,000

An unusually large fall of rain occurred October 12-14, 1895; beginning at 1.30 P.M. on Saturday, October 12, the rain was continuous and uniform until 4.15 A.M. of Monday, October 14, 1895. During that time—less than thirty-nine hours—7.5 inches of rain fell.

Reservoir No. 1.

Grades, H.W., 161.00; Tops of Flash-boards, 159.29 and 158.41; Crest of Dam, 157.54. Area, Water Surface, 143 acres; Greatest Depth, 14 ft.; Contents below 161.00, 376,900,000 gals.; Below 159.29, 288,400,000 gals.

The surface of this reservoir was about one foot below the crest of the dam on January 1, 1895. Waste began January 13 and continued until February 2, and no more waste occurred until March 12.

From March 12 to May 9 water was wasted over the dam, and on May 9 the flash-boards were placed in position. On May 22 the reservoir was full, and waste began over the flash-boards, lasting until May 28. From June 5 to June 9

water was wasted over the flash-boards. The flash-boards were removed on October 16, and waste occurred from October 16 to January 1, 1896. The dam is in good condition.

Reservoir No. 2.

Grades, H.W., 168.00; Tops of Flash-boards, 167.12 and 166.49; Crest of Dam, 165.87. Area, Water Surface, 134 acres; Greatest Depth, 17 ft.; Contents Below 168.00, 568,300,000 gals.; Below 167.12, 529,860,000 gals.

On January 1, 1895, water was wasting over the dam. From January 3 to 13 there was no waste. Beginning on the 13th, water was wasted until February 10. Waste occurred from March 11 until May 9, when the flash-boards were placed upon the dam. On April 8 the reservoir was drawn upon for the supply of the city. During July, August, September, and part of October, water was run into the reservoir from Reservoirs 4 and 6. The flash-boards were removed from the dam on November 6. Waste occurred on that day, and continued during the remainder of the year. The dam is in good condition.

Reservoir No. 3.

Grades, H.W., 177.00; Crest of Dam (no Flash-boards), 175.24. Area at 177.00, 253 acres; Contents below 177.00, 1,224,500,000 gallons. Area at 175.24, 248 acres; Contents below 175.24, 1,081,500,000 gallons. Greatest Depth, 21 ft.

On January 1, 1895, this reservoir was full. On January 11 waste began, and continued until February 7. Waste also occurred from March 10 to May 7. On July 25 the surface of reservoir was 5.25 feet below crest of the dam. Filling slowly from that time, the water surface reached the crest of the dam on October 16. From October 16 to January 1, 1896, water has wasted over the dam, excepting October 29 and November 16. The dam is in good condition.

Reservoir No. 4.

Grades, H.W., 215.21; Tops of Flash-boards, 215.21 and 214.89; Crest of Dam, 214.23. Area, Water Surface, 167 acres; Greatest Depth, 49 ft.; Contents below 215.21, 1,416,400,000 gallons.

On January 1, 1895, the surface of water in the reservoir was 18.05 feet below the crest of the dam. The reservoir filled gradually, and on April 9 waste began, and continued until May 9, when one set of flash-boards was placed upon the dam. Water wasted over the first set of flash-boards from May 14 to May 23, when the second set of flash-boards was added. Waste occurred over the second set from May 28 to June 19 and from June 28 to July 4. On July 3 the reservoir was drawn upon for the supply of the city, and on October 12 the water surface had fallen 22.45 feet below the

crest of the dam. Since October 12 it has been gradually filling. The dam is in good condition.

Reservoir No. 5.

Work for the year was commenced on April 13, and has been prosecuted throughout the year. The following report of Desmond FitzGerald, Resident Engineer, gives further information in regard to the work on this reservoir, as well as other matters connected with additional supply:

SOUTHBOROUGH, MASS., January 1, 1896.

WILLIAM JACKSON, ESQ., *City Engineer*:

DEAR SIR: Herewith please find report of work accomplished by additional supply force under my direction during the past year. The grounds adjoining the embankment of Dam No. 6 have been cleared of waste material, graded, and top-dressed with loam. The filter beds are now under construction; one bed has been entirely completed and under-drained, and the second bed has been graded and is ready for the drains.

Stone bounds have been set at the angles of all the pieces of land owned by the city at Basin No. 6. At Dam No. 5 work was begun on April 13, and continued at a satisfactory rate during the year. The following grades indicate in a general way the progress made:

Masonry section from grade 190 to grade 217.

Earth embankment at northerly end of dam from grade 203 to grade 210.

Earth embankment at southerly end of dam from grade 220 to grade 224.

The core wall at northerly end of dam is completed to grade 211, and at the southerly end to grade 225.

The northerly wing wall is completed to grade 217, and the southerly one to grade 225.

The quantities of materials handled during the year on the dam are as follows:

Soil moved	.	.	.	.	.	1,409	cubic yards.
Soil placed on dam	.	.	.	.	.	776	" "
Earth excavation	.	.	.	.	.	61,109	" "
Rock excavation	.	.	.	.	.	2,154	" "
Concrete masonry	.	.	.	.	.	3,825	" "
Rubble masonry	.	.	.	.	.	15,812	" "
Range work	.	.	.	.	.	2,281	" "
Plastering	.	.	.	.	.	1,657	square "

In connection with the reservoir the work of stripping on

Section A was continued until September. The completion of this section must await the removal of the injunction which now holds against carrying on work. Early in the year plans and specifications were prepared for letting two portions of the new Framingham-Marlboro' road, comprising about $2\frac{3}{4}$ miles in length.

This work was let in April and completed during the year.

In February and March plans and specifications were prepared for the stripping and shallow flowage connected with the Stony-brook branch of the basin. This work was let in April and is now well under way. The following quantities of materials have been moved in connection with the stripping :

Earth excavation	.	.	.	.	698,654 cubic yards.
Split stone masonry	.	.	.	.	2,048 " "
Paving in mortar	.	.	.	.	369 " "
Concrete masonry	.	.	.	.	740 " "
Rubble masonry	.	.	.	.	811 " "
Dry paving	.	.	.	.	730 " "
Rip-rap	.	.	.	.	2,784 " "
Stone wall	.	.	.	.	71 rods.

The contract for building 20,000 linear feet of iron fence was made in July, and under this contract 2,300 feet have been constructed. The lands owned by the city and the road lines have been marked by stone bounds. In April a contract was made for grading a series of 20 filter beds near Marlboro' Junction. This work has been completed and the final estimate is now under way. Besides the above work, a number of plans and estimates have been made for an extension of the work on this basin.

Respectfully submitted,

(Signed) DESMOND FITZGERALD,
Resident Engineer.

Reservoir No. 6.

*Grades, H.W., 295.00 ; Top of Flash-boards, 295.00 ; Crest of Dam, 294.00.
Estimated Area, 185 acres ; Estimated Contents, 1,530,300,000 gals.*

The surface of the reservoir was 15.16 feet below the crest of the dam on January 1, 1895. Filling gradually, water began to waste over the dam on April 5, and continued until May 9, when the first set of flash-boards was placed upon the dam. On May 19 water wasted over the flash-boards, and continued until May 23.

The second set was placed upon the dam on May 23, and waste occurred over this set from May 23 to June 17. On

October 13 the water surface reached its lowest point, being 21.74 feet below the crest of the dam. During November and December it filled gradually, and on December 27 waste began over the crest of the dam. The dam is in good condition.

Whitehall Pond.

*Elevation, H.W., 327.91; Bottom of Gates, 317.78.
Area at 327.91, 601 acres; Contents, between 327.91 and 317.78, 1,256,900,000 gals.*

On January 1, 1895, the water surface of this pond was 323.23 feet, or 4.68 feet below high water. It rose during the spring, the water surface on May 1 being 326.95, or .96 feet below high water. It remained at about this height until June 15, when it fell; and on October 12 the water surface was 323.22.

Since October 12 it has been gradually filling. Water was drawn from the pond, for the supply of the city, from March 25 to April 5, April 9 to 12, April 15 to 20, April 30 to May 23, June 14 to July 24, August 8 to October 14, and November 27 to January 1, 1896. Plans for a new dam at Whitehall pond have been perfected.

Farm Pond.

*Grades, H.W., 149.25; Low Water, 146.00.
Area at 149.25, 159 acres; Contents, between 149.25 and 146.00, 165,500,000 gals.*

No water was drawn from this pond for the supply of the city during the year 1895.

On January 1, 1895, the surface of the pond was 46 feet below high water. High-water mark was reached on January 23, and on April 15 the water surface was at grade 149.70.

It remained at or above 149.00 until August 20. The lowest point reached was on September 29, and on October 14 high-water mark was again reached, remaining at that height during November and December. The Framingham Water Company has drawn 132,200,000 gallons from the pond during the year.

Lake Cochituate.

*Grades, H.W., 134.36; Invert Aqueduct, 121.03; Top of Aqueduct, 127.36.
Area, Water Surface at 134.36, 785 acres; Contents, between 134.36 and 127.36,
1,515,180,000 gals.; between 134.36 and 125.03, 1,910,280,000 gals.
Approximate Contents, between 134.36 and 121.03, 2,447,000,000 gals.; Between
134.36 and 117.03, 2,907,000,000 gals.*

The dam is in good condition. On January 1, 1895, the surface of the lake was 8.08 feet below high-water mark.

It remained at about this level until March 1, when it began to rise. On March 10 water was turned into the lake from the Sudbury river, and on April 15 the water surface

was at high-water mark. It remained at about high-water mark until May 5, after which its surface fell until October 12, being 128.28 on that day. On January 1, 1896, the water surface was 132.30, or 2.06 feet below high-water mark.

The beds for filtering the water of Pegan brook have been in use for the greater portion of the year, and 273,698,000 gallons have been pumped upon them. No difficulty has been experienced in their operation during the winter season.

Water has been drawn from the different reservoirs as follows:

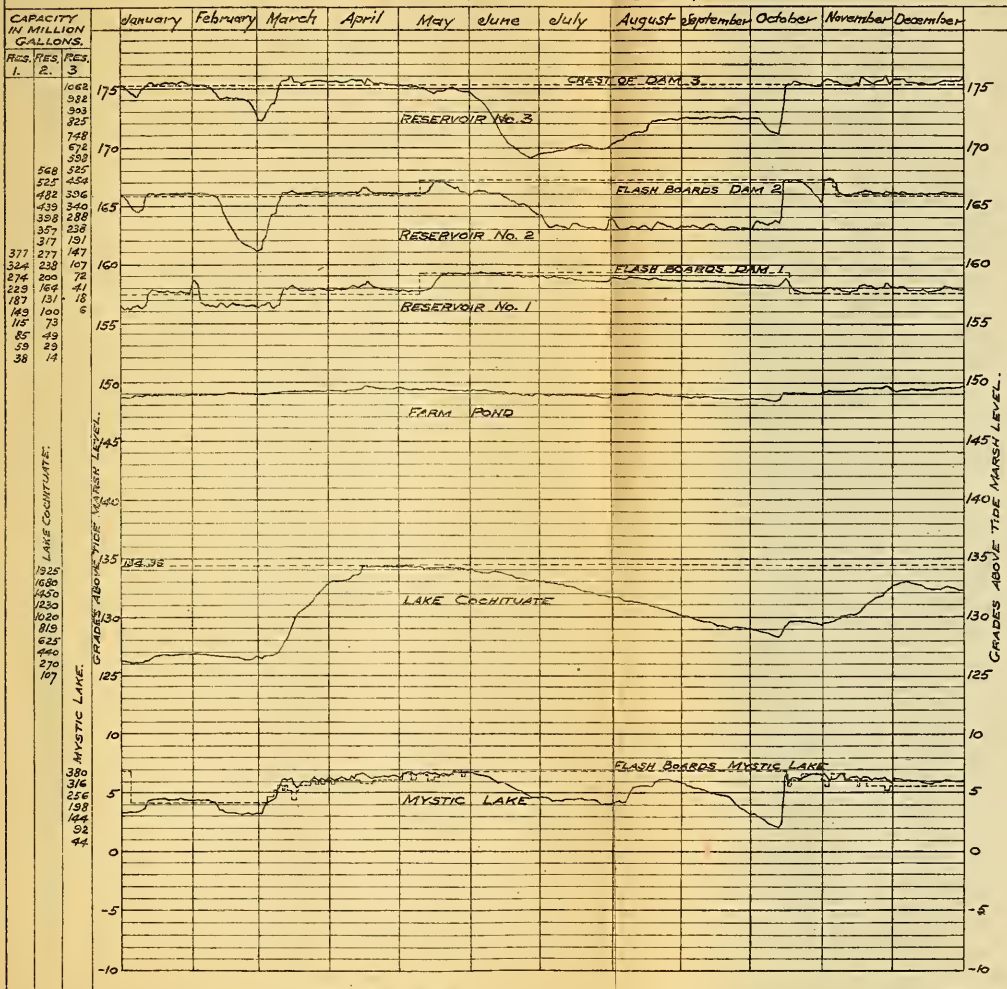
From 7	A.M. Jan. 1 to 2	P.M. Apr. 8 from Reservoir No. 1.
" 2	P.M. Apr. 8 " 11.40	A.M. June 27 " " Nos. 2, 3.
" 11.40	A.M. June 27 " 11	A.M. July 19 " " No. 2.
" 11	A.M. July 19 " 7	A.M. July 24 " " Nos. 2, 3.
" 7	A.M. July 24 " 12	M. Oct. 1 " " No. 2.
" 12	M. Oct. 1 " 2	P.M. Oct. 3 No flow.
" 2	P.M. Oct. 3 " 10	A.M. Oct. 13 from Reservoir Nos. 2, 3.
" 10	A.M. Oct. 13 " 11	A.M. Oct. 24 " " No. 2.
" 11	A.M. Oct. 24 " 7	A.M. Nov. 25 " " Nos. 2, 3.
" 11	A.M. Nov. 25 " 11	A.M. Dec. 3 " " No. 2.
" 11	A.M. Dec. 3 " 1	P.M. Dec. 5 No flow.
" 1	P.M. Dec. 5 " 11	A.M. Dec. 23 from Reservoir Nos. 2, 3.
" 11	A.M. Dec. 23 " 7	A.M. Jan. 1 " " No. 2.

The height of the water in the various storage reservoirs on the first day of each month is given below:

		RESERVOIRS.					FARM POND.	WHITE-HALL POND.	LAKE COCHITUATE.
		No. 1.	No. 2.	No. 3.	No. 4.	No. 6.			
		Top of Flash-boards.	Top of Flash-boards.	Crest of Dam.	Crest of Dam.	Top of Flash-boards.	High Water.	High Water.	Top of Flash-boards.
		159.29	167.12	175.24	214.23	295.00	149.25	327.91	134.36
January 1,	1895 . .	156.50	166.00	175.24	196.18	278.84	148.79	323.23	126.28
February 1,	" . .	157.83	166.05	175.45	201.65	283.48	149.06	324.26	126.90
March 1,	" . .	156.46	161.22	172.47	203.79	285.21	149.01	324.63	126.50
April 1,	" . .	157.86	166.16	175.66	212.91	293.42	149.35	325.71	132.97
May 1,	" . .	157.86	166.09	175.37	214.60	294.28	149.63	326.95	134.35
June 1,	" . .	159.25	166.05	174.68	215.34	295.02	149.32	326.98	134.04
July 1,	" . .	159.04	164.23	169.46	215.31	295.04	149.01	325.81	133.09
August 1,	" . .	158.91	163.97	170.47	210.25	290.58	149.00	325.28	131.72
September 1,	" . .	158.68	163.30	172.50	203.98	283.91	148.89	324.62	130.20
October 1,	" . .	158.32	163.14	172.57	194.41	273.64	148.58	323.68	128.98
November 1,	" . .	157.91	167.15	175.66	197.35	279.19	149.27	324.73	129.63
December 1,	" . .	158.10	166.23	175.77	207.83	289.92	149.36	326.36	132.71
January 1,	1896 . .	158.11	166.17	175.75	213.86	294.39	149.67	325.29	132.30

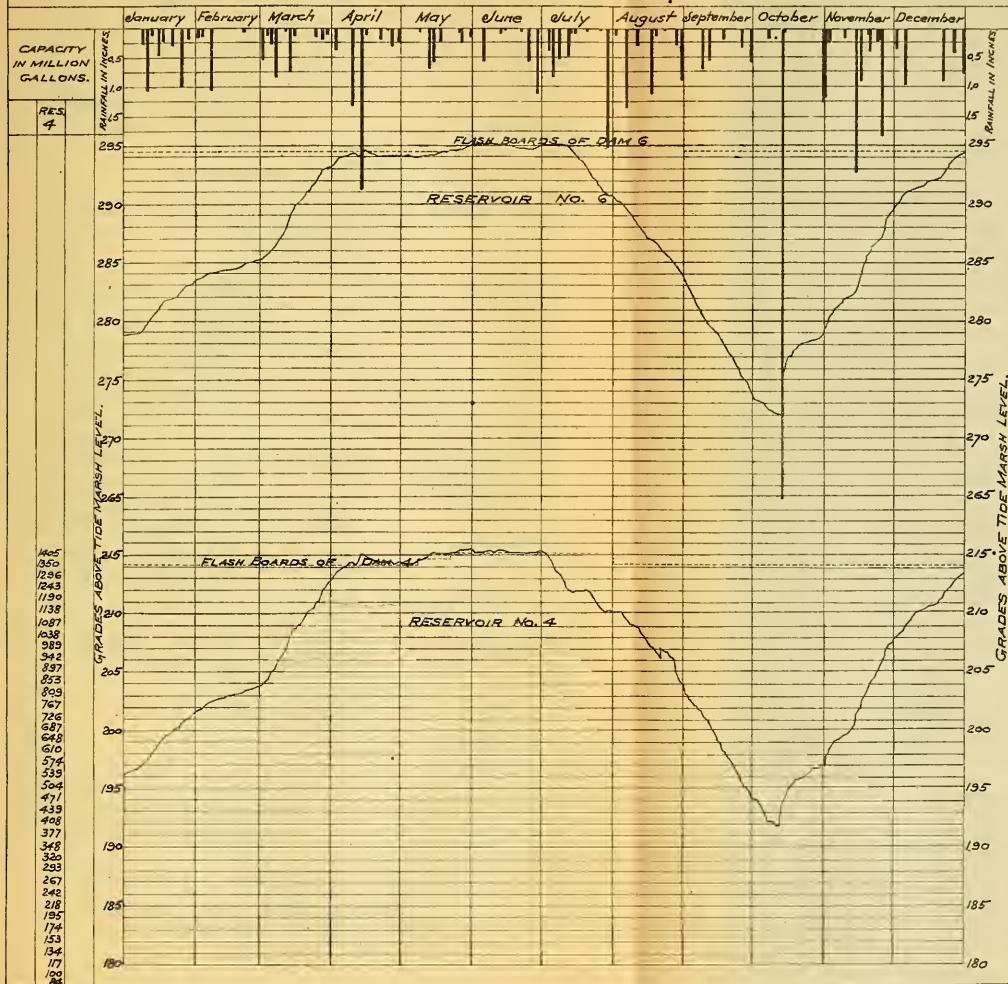
BOSTON WATER WORKS.

Diagram showing the heights of Sudbury River Reservoirs Nos. 1, 2 and 3, Farm Pond and Cochituate and Mystic Lakes during the year 1895.



BOSTON WATER WORKS.

Diagram showing the heights of Sudbury River Reservoirs Nos. 4 and 6, and the Rainfall on the Sudbury River Water Shed during the year 1895.



AQUEDUCTS AND DISTRIBUTING RESERVOIRS.

The Sudbury-river aqueduct has been in use 335.9 days, and has delivered 12,908,500,000 gallons into Chestnut-Hill Reservoir, and 896,800,000 gallons into Lake Cochituate. The Cochituate aqueduct has been used 361 days, and delivered 5,654,765,700 gallons. Both aqueducts have been cleaned during the year.

The different distributing reservoirs are in good condition.

HIGH-SERVICE PUMPING-STATIONS.

The daily average quantity pumped at the Chestnut-Hill station was 9.4 per cent. more than in 1894.

Engine No. 1 was run 4,341 hours	
12 minutes, pumping . . .	1,739,232,730 gallons.
Engine No. 2 was run 2,285 hours	
35 minutes, pumping . . .	919,218,525 “
Engine No. 3 was run 1,793 hours	
16 minutes, pumping . . .	1,507,338,275 “
Total amount pumped . . .	4,165,789,530 “
Amount coal used by Engines Nos.	
1 and 2	3,363,475 lbs.
Amount coal used by Engine No. 3,	1,503,331 “
Total amount coal used . . .	4,866,806 “
Percentage ashes and clinkers .	10.3
Quantity pumped per lb. of coal,	
Engines Nos. 1 and 2 . . .	790.4 gallons.
Quantity pumped per lb. of coal,	
Engine No. 3	1,002.7 “
Daily average amount pumped .	11,413,100 “

Table VII., on pages 167, 168, shows in detail the work done by the engines and boilers.

COST OF PUMPING.

Salaries	\$14,854 11
Fuel	11,261 46
Repairs	803 09
Oil, waste, and packing . . .	1,759 73
Small supplies	2,888 46
Total	<hr/> \$31,566 85
Cost per million gallons pumped to reservoir,	\$7 58

The following are notes of a practice test of Engine No. 3, made by students of Massachusetts Institute of Technology, under the direction of Professor Miller :

Fire started under boiler	8.30 A.M.
Engine started	9.08 “
Engine test began	9.15 “
Engine test ended	9.15 “
Length of engine trial (steam basis)	24 hours
Length of engine trial (coal basis)	24.3 “
Revolutions, 9.08 A.M. to 9.26 A.M.	73,516
Revolutions, 9.15 “ 9.15 “	72,843
Coal burned	16,839 lbs.
Coal burned, less 200 lbs. allowance for fall- ing grate	16,639 “
Water received from engine and weighed to boiler	142,528 “
Cold water make up	8,532 “
Total amount weighed to boiler	151,060 “
Less leakage from feed pump	1,440 “
	<hr/>
	149,620 “
Steam required by plant for 24 hours, except H.P. jackets	146,226 “

TEMPERATURES.

Engine-room	23.3° C.
Condensed steam from air pump	89.3 F.
Cold condensing water	51.9
Hot condensing water	85.2
Feed water to economizer	127.
Feed water to boiler from economizer	198.3
Jacket return at engine	370.6
Jacket return at boiler	369.6
Gases entering economizer	502.
Gases leaving economizer	233.

PRESSURES.

Barometer	14.85 lbs.
Steam at throttle	175.7 “
Vacuum in condenser	27.25 in.
First receiver	46.5 lbs.
Second receiver	2.4 “
Low-pressure jacket	99.6 “
High-pressure jacket	175.7 “
Draught in inches	0.375

		Head.	Crank.	Total.	
Horse power.	High.	80.78	70.08	150.86	
	Int.	97.05	89.09	186.14	
	Low.	117.12	121.54	238.66	Tot., 575.66

		Pump end.	Steam end.	Total.	
Pump H.P.	High.	90.12	85.95	176.07	
	Int.	91.59	87.36	178.95	
	Low.	87.90	86.94	174.84	529.86

Steam per H.P. per hour, engine alone	11.22 lbs.
Coal per H.P. per hour, whole plant	1.18 “
Lift in feet	137.48 ft.
Water over weir, 24 hours	21,016,000 gals.
Slip	1.83 per cent.
Duty per 100 lbs. coal	150,045,000
Duty per 1,000,000 B.T.U.	145,470,000
Duty per 100 lbs. combustible	160,000,000

At the West Roxbury pumping-station the daily average quantity pumped was 179,200 gallons, an increase of 47.5 per cent. over the amount pumped in the previous year.

At the East Boston station 465,500 gallons per day have been pumped for the supply of the high-service district, and 39,300 gallons per day for the Breed's Island high-service.

HIGH SERVICE.

In 1870 the high-service works were established, with a capacity of 5,000,000 gallons daily with no storage.

In 1874 a reservoir was built on Parker Hill, with a capacity of 7,200,000 gallons, the average daily consumption being at that time 1,200,000 gallons. Late in 1885 the consumption of water from the high service had reached 2,500,000 gallons daily; the demand for its extension was pressing, and a new pumping-station with a capacity of

16,000,000 gallons daily was constructed at Chestnut-Hill reservoir, and an additional reservoir at Fisher Hill having a capacity of 15,400,000 gallons, making with the Parker-Hill reservoir a total storage capacity of 22,600,000 gallons.

In 1894 the consumption had reached over 11,000,000 gallons daily, and a new pump was added to the Chestnut-Hill plant having a capacity of 20,000,000 gallons daily.

The consumption for high service for the year 1895 averaged 10,384,600 gallons daily, the maximum being 11,719,300 gallons; it is evident that our present reserve in the Parker and Fisher Hill reservoirs is not sufficient, and an additional reservoir or reservoirs should be constructed at once with as large a capacity as it is practicable to obtain. It would be desirable to have, were it possible, a reservoir storage of 200,000,000 gallons.

Owing to the rapid increase of the portion of the city which is supplied from the high service, steps should also be taken at once, looking to the addition of another engine to the present plant. The experience of the past shows that it requires several years to design and build a pumping-engine, and at the present rate of increase in the high-service consumption the safe capacity of the present plant will have been reached by the time an additional engine can be supplied if work is commenced at once on the plans.

MYSTIC LAKE.

Grades, H.W., 7.00; Invert of Aqueduct, -4.17; Contents, between 7.00 and 1.50, 442,000,000 gallons.

On January 1, 1895, the lake surface was 3.63 feet below high water. On March 4 it had risen to grade 4.14, and the stop-planks were placed upon the dam, waste occurring over the stop-planks from March 9 to May 29. On May 29 the water surface was at 6.85; falling gradually, it reached grade 4.08 on July 29. The fish-way was opened on April 16, and was kept open until June 20, when it was closed, and remained closed the remainder of the year.

The lowest point reached during the year was on October 12, the water surface being at grade 2.15, or 4.85 feet below high water.

Waste occurred over the dam from October 15 to January 1, 1896, with the exception of five days in the early part of November.

The dam at the outlet of the lake is in good condition.

MYSTIC VALLEY SEWER.

The operation of this plant by the city ended on July 18, 1895, when the Metropolitan Sewerage Commission assumed control of it. During the time of operation, 70,013,500 gallons of sewage were pumped and chemically treated with sulphate of aluminum. Table XI., on page 172, gives the monthly quantities of sewage pumped, coal and aluminum used.

MYSTIC CONDUIT AND RESERVOIR.

The conduit has been cleaned several times during the year.

The repairs recommended at the conduit screen-chamber, namely, replacing the wooden sills with stone sills and the renewing of the grooves for the screens, have been made during the year.

MYSTIC PUMPING-STATION.

Engine No. 1 was used 3,240 hours,	
pumping	720,723,300 gals.
Engine No. 2 was used 1,392 $\frac{3}{4}$ hours,	
pumping	295,205,000 "
Engine No. 3 was used 6,676 $\frac{2}{3}$ hours,	
pumping	2,276,190,200 "
Engine No. 4 was used 380 hours,	
pumping	163,704,200 "
Total quantity pumped	3,455,822,700 "
Daily average quantity pumped	9,468,000 "
Total quantity of coal burned	8,121,000 lbs.
Percentage ashes and clinkers	10.9
Quantity pumped per lb. of coal	425.5 gals.

COST OF PUMPING.

Salaries	\$11,560 94
Fuel	13,650 80
Repairs	2,867 04
Oil, waste, and packing	1,161 60
Small supplies	1,328 69

Total \$30,569 07

Cost per million gallons pumped to reservoir, \$8.84

Table VIII., on page 169, shows in detail the work done by the engines during the year. The foundation for Engine No. 4 was finished and ready for the erection of the engine on April 1, 1895, and about April 15 the G. F. Blake Manufacturing Company commenced to deliver parts of the pump and began the work of erecting the engine. The engine was run for the first time on August 28, and has been in use more or less since that time. It has been lagged, painted, etc., and is now practically finished and ready to be accepted by the city. The engine has not yet been tested by the city.

The Mystic Pumping-engine No. 4 is an independent compound beam and flywheel engine of the Leavitt type, and operates two differential plunger pumps.

The steam cylinders are vertical and inverted, one high and one low pressure, with pistons connected to opposite ends of the beam.

The pumps are located beneath the engine bedplate, in a masonry pit, and their plungers are rigidly connected to the steam-piston crossheads.

The high-pressure piston with its connected pump plunger makes its upward stroke at the same time that the low-pressure piston and its plunger are making their downward stroke, and *vice versa*.

The pumps rest upon solid masonry foundations at the bottom of the pit, to which they are strongly bolted; their upper ends are firmly secured to the engine bedplate by adjustable stools and bolts.

The discharge from the pump worked by high-pressure piston is into the delivery chamber of the pump worked by the low-pressure piston, from whence it enters the force main. Similarly the suction main connects with the low-pressure pump inlet chamber, with which the inlet chamber of the high-pressure pump is connected.

Each pump consists of three principal sections, viz.: the upper chamber, forming the air vessel and containing the delivery valves; middle chamber, containing the suction valves; and lower or inlet chamber, which is constructed to form a vacuum chamber.

The pump valves consist of thin flat rings of composition, working over annular openings in the valve seats and closed by springs.

The pedestals for the main beam pin and crank shaft journals are formed in the engine bedplate, and are all in the same horizontal plane.

The main framing for supporting the steam cylinders consists of two massive columns forming the crosshead guides and five auxiliary columns, all of which have their bases bolted to the bedplate and their caps to the entablature.

The steam distribution is effected by Corliss valves and valve gear, with separate eccentrics for the inlet and exhaust gear.

The cylinders are thoroughly steam-jacketed on sides and ends, and the exhaust from the high-pressure cylinder enters a reheater filled with tubes containing high-pressure steam, on its way to the low-pressure cylinder.

All heated surfaces are thoroughly protected from radiation by approved non-conductors and handsome black walnut lagging.

The condensing apparatus is of the jet type, with a double-acting horizontal air pump worked from the beam.

There is a cast-iron gallery surrounding the cylinder bases, which is provided with a polished brass handrail and finished wrought-iron stanchions; the gallery is reached by an iron stair at the low-pressure end of the engine.

The leading dimensions of the engine are :

The high-pressure cylinder is bored 21 inches and the low-pressure cylinder 42 inches diameter, with 4-foot stroke of pistons.

The upper pump plungers are turned $14\frac{7}{8}$ inches and the lower plungers 21 inches diameter, with a stroke of 4 feet.

The radius of the beam is 51 inches to centres of link and connecting-rod attachments, and 17 inches to centre of pin working air pump.

The air pump is $16\frac{3}{8}$ inches diameter by 16 inches stroke.

The horizontal distance between centres of cylinders and pumps is 8 feet, ditto between centres of main beam pin, and crank shaft $10\text{ feet } 8\frac{5}{8}\text{ inches}$.

The length of connecting rod from centre to centre of journals is 10 feet, and of the steam links 3 feet $\frac{1}{2}$ inch. The radius of the crank is 2 feet.

Diameter of flywheel is 18 feet; weight of same, about 17 tons.

Speed of the engine for regular working capacity, 51 revolutions per minute. Displacement capacity at above speed in U. S. gallons per 24 hours amounts to 10,570,000.

The working boiler-pressure is 100 pounds per square inch above atmosphere.

The following preliminary test of Engine No. 4 was made by the builders, The Geo. F. Blake Manufacturing Co., December 13-14, 1895 :

Duration of test, 24 hours 30 seconds.

Total number of revolutions, 74,385.

Pressure by gauge near engine, 95.3 lbs.

Pressure by gauge on receiver, 5.9 lbs.

Pressure by mercurial column on condenser, 27.3 ins.

Total pressure per square inch on pump, 65.7 lbs.

Revolutions per minute, 51.7.

Horse-powers: High-pressure steam cylinder, top, 74.5; bottom, 79.65; total, 154.15. Low-pressure steam cylinder, top, 83.19; bottom, 83.71; total, 166.9. Both steam cylinders, total, 321.05.

Horse-power of main pump cylinders, 284.86.

Water pumped in 24 hours by displacement, 10,703,000 gals.

Total coal burned during the test, 10,661 lbs.

Water pumped per pound of coal, 1,004 gallons.

Coal per pump horse-power, per hour, 1.56 lbs.

Duty per 100 lbs. of coal, 127,000,000 ft. lbs.

CONSUMPTION.

The daily average consumption for the year was as follows :

Sudbury and Cochituate works	.	.	50,801,100 gals.
Mystic works	.	.	9,467,000 "
Total for the combined supplies			60,268,100 "

an increase of 3,426,000 gallons, or 6 per cent., from that of the previous year.

On account of the limited quantity of the Mystic supply at the beginning of the year, all of Charlestown District lying east of Cambridge street has been supplied from the Cochituate works during the entire year, with the exception of the periods between February 6 to 21, and May 18 to July 13.

The following table shows the consumption per inhabitant for the past two years :

MONTH.	Cochituate.		Mystic.		Combined Supplies.	
	Consumption in Gallons per Capita.		Consumption in Gallons per Capita.		Consumption in Gallons per Capita.	
	1894.	1895.	1894.	1895.	1894.	1895.
January	108.1	104.9	91.9	92.0	104.5	102.7
February	109.6	129.4	95.4	94.8	106.5	120.7
March	99.7	107.1	83.0	83.5	96.0	102.9
April	88.9	94.5	79.0	77.3	86.7	91.5
May	92.6	97.3	82.1	77.6	90.2	93.3
June	101.4	102.0	96.4	83.2	100.3	97.6
July	110.3	104.2	93.3	76.8	106.5	98.7
August	104.0	107.0	81.8	76.5	99.0	101.6
September	98.2	107.1	94.3	93.3	97.6	104.7
October	95.0	98.9	80.1	81.1	92.6	95.8
November	94.8	96.7	81.3	78.8	92.7	93.6
December	97.5	105.9	92.8	86.1	93.7	102.4
Average	99.8	104.3	87.6	83.3	97.4	100.3

The daily average consumption was, last year, 24 per cent. in excess of the dry-year capacity of the combined system of water supply.

WHITEHALL POND.

Last June plans and specifications were prepared for a new dam at the outlet of Whitehall pond, for the purpose of increasing the storage capacity of the pond, but on account of complications arising by reason of the proposed taking of the supply systems by the State, nothing was done. It is now so evident, however, that the proposed increased storage of Whitehall pond is necessary that the construction of the new dam should be no longer delayed.

CORROSION OF PIPES BY ELECTROLYSIS.

The investigations of the effect of electrolysis upon the water-pipes have been continued during the year, under the supervision of Messrs. Stone & Webster, and in brief the results arrived at are as follows :

WILLIAM JACKSON, *City Engineer, Boston, Mass.:*

DEAR SIR: In our reports for the years 1893 and 1894 we considered the theory of electrolytic corrosion of water-pipes, giving detailed accounts of the experiments we were carrying on, and of our methods of investigation.

For the past year we have spent a great deal of time in taking hydrant readings in almost every part of the city where electric-car tracks are located, and have already made three minor reports on the work.

During the summer of 1895 we confined our investigations to the most thickly-settled portion of the city, and along the car lines extending into the suburbs. These investigations showed that the electrical condition of the pipes had changed for the better. Readings taken at the service-pipe stations, which we installed in 1894, as described in our report for that year, showed also that there has been a marked improvement.

In the fall we confined our investigations to the district about Brighton. Here in one locality we found slight indications of electrolytic corrosion, and in our report for November we suggested the remedy of bending the pipes to the tracks at a point on Cambridge street.

Owing to the fact that the ground was frozen, and to the unfavorable condition of the weather, we were unable to renew electrolytic investigations until the last of March. Since that time, however, we have made careful investigations in Charlestown and East Boston, and have found no indications of danger in these districts. This result is in accordance with the observations made last summer. At the time of writing this report we are carrying on investigations in South Boston, the indications being that there are some points of danger; but we have not arrived at conclusions sufficiently definite to be incorporated here.

The electrical conditions of the pipes is in the main improving, showing that measures have been taken to lessen the possibility of corrosion. Notwithstanding this improvement, there are districts which are not entirely free from electrolytic action; and, moreover, there is always liability to corrosion at isolated points, as well as the ever-present danger due to deterioration of rail bonds and supplementary return wires.

(Signed)

STONE & WEBSTER.

DISTRIBUTION.

On the Cochituate works $26\frac{1}{4}$ miles of pipe were laid and $2\frac{1}{8}$ miles abandoned, making a net increase of 23.1 miles and a total of 595.9 miles now connected with the system.

A 20-inch main for the supply of Brighton was laid as far as Brighton avenue early in the season, and was in service in June.

The 30-inch main for the South Boston low service was extended from Washington Village, through Dorchester avenue and D street, as far as Congress street, a length of 8,373 feet.

For the improvement of the high service in Roxbury and Dorchester, the 48-inch, 42-inch, and a part of the 36-inch lines, recommended in 1894, were laid during the year; the 48-inch pipe extends from the junction of Fisher avenue and Boylston street through Boylston, Walnut, and Washington streets in Brookline, and through Huntington avenue, to Heath street, a length of 8,290 feet; 7,965 feet of this were laid by contract. At Heath street the pipe is divided into 42-inch and 36-inch lines; the 42-inch pipe continues through Huntington avenue, Clarendon street, Newbury street, the Public Garden and the Common, to Park street. Connection is made with the 20-inch high-service pipe in Huntington avenue, at Wait and Gainsboro' streets. On the Common, after connecting with the 20-inch high-service pipe, the 42-inch line is reduced to 30 inches. Opposite Temple place the 30-inch pipe is again reduced to 16-inch and continued to Park street. The length of 42-inch pipe laid was 15,478 feet, of which 9,186 feet were laid by contract. Water was let on to the 48 and 42 inch lines as far as Wait street on October 20, 1895.

From Huntington avenue and Heath street the 36-inch line runs through Heath street as far as Parker street, and is connected with the 24-inch high-service pipe at Hayden street and at Parker street. These new lines have given an increased pressure in Roxbury and Dorchester, of nine and six pounds respectively at times of minimum pressure; when the water was turned on, Parker-Hill Reservoir quickly filled up, and was shut off to prevent overflowing. It is now out of service, and will be maintained as a reserve reservoir for use in emergency.

A small pumping-plant has been established on Wayne street, at Blue Hill avenue, to improve the service in the Elm-Hill district.

The distributing mains connected with the Mystic works

have been extended 4.9 miles, and 7.4 miles have been relaid. The total length now in service is 178.6 miles.

There has been an increase of 242 in the number of hydrants connected with the Cochituate works, making a total now in use of 6,459.

On the Mystic works 97 hydrants have been added, and the total now in use is 1,543.

260 petitions for main pipe have been reported upon, and 88 contracts for rock excavation have been made.

Various profiles have been made, levels taken, and lines and grades furnished for the main-pipe laying.

All pipe laid has been located and plotted on the plans.

During a severe spell of cold weather in January the pipes between the islands in the harbor were frozen, and burst in a number of places. Service between Moon and Long Islands was at once reëstablished by laying a 2-inch lead pipe, and as soon as practicable contracts were awarded for laying 6-inch pipe, with Ward's flexible joints, between Long and Moon Islands and Long and Gallop's Islands. In each case the pipes were laid in a trench excavated 6 feet deep between mean high-water marks. After the lines were tested the trenches were carefully back-filled. A contract has also been awarded for laying a 4-inch flexible pipe from Long Island to Rainsford Island. This work is now in progress.

Appended to this report will be found the usual tables of rainfall, consumption, etc., for the past year, and in addition, tables are given of the rainfall, rainfall collected, and percentage collected on the Cochituate water-shed since 1863, on the Sudbury-river water-shed since 1875, and on the Mystic water-shed since 1878. These will be found valuable for future reference.

Yours respectfully,

WILLIAM JACKSON,
City Engineer.

GENERAL STATISTICS.

SUDBURY AND COCHITUATE WORKS.	1892.	1893.	1894.	1895.
Daily average consumption in gallons....	41,312,400	47,453,200	46,560,000	50,801,100
Daily average consumption in gallons per inhabitant.....	96.1	107.5	99.8	104.3
Daily average amount used through meters, gallons.....	11,225,900	11,651,600	11,170,400	12,084,500
Percentage of total consumption metered.	27.2	24.5	24.0	23.8
Number of services.....	65,074	66,586	68,556	70,879
Number of meters and motors.....	4,412	4,585	4,877	4,910
Length of supply and distributing mains, in miles.....	536	560	572.8	595.9
Number of fire-hydrants in use.....	5,793	6,042	6,217	6,459
Yearly revenue from water-rates.....	\$1,433,413 78	\$1,637,531 94	\$1,644,405 25	\$1,784,954.01
Yearly revenue from metered water....	\$649,672 31	\$683,948 52	\$672,474 17	\$711,467.39
Percentage of total revenue from metered water.....	45.3	41.8	40.9	39.9
Cost of works on February 1.....	\$22,243,351 56	\$22,727,456 03	\$23,583,967 89	\$25,052,227.53
Yearly expense of maintenance.....	\$392,762 21	\$433,408 18	\$440,840 63	\$420,907.09
MYSTIC WORKS.				
Daily average consumption in gallons....	9,810,800	10,742,500	10,282,100	9,467,000
Daily average consumption in gallons per inhabitant.....	78.8	84.4	87.6	83.3
Daily average amount used through meters, gallons.....	1,862,200	1,921,570	2,014,000	2,105,800
Percentage of total consumption metered.	19.0	17.9	19.6	22.2
Number of services.....	21,588	22,398	23,257	24,120
Number of meters and motors.....	550	482	515	525
Length of supply and distributing mains, in miles.....	160	165	173.7	178.6
Number of fire-hydrants in use.....	1,223	1,306	1,446	1,543
Yearly revenue from water-rates.....	\$394,008 75	\$421,573 48	\$447,554 35	\$481,017.15
Yearly revenue from metered water....	\$105,685 56	\$109,367 37	\$115,811 32	\$121,436.10
Percentage of total revenue from metered water.....	26.8	25.9	25.9	25.2
Cost of works on February 1.....	\$1,713,227 00	\$1,721,609 33	* \$1,676,471 94	\$1,803,775.29
Yearly expense of maintenance.....	\$129,354 49	\$160,643 97	\$156,214 05	\$189,194.61

* \$52,637.00 credited on account of sale of portion of Mystic Sewer.

TABLE I.

Daily Average Consumption of Water, in Gallons, from the Cochituate and Mystic Works.

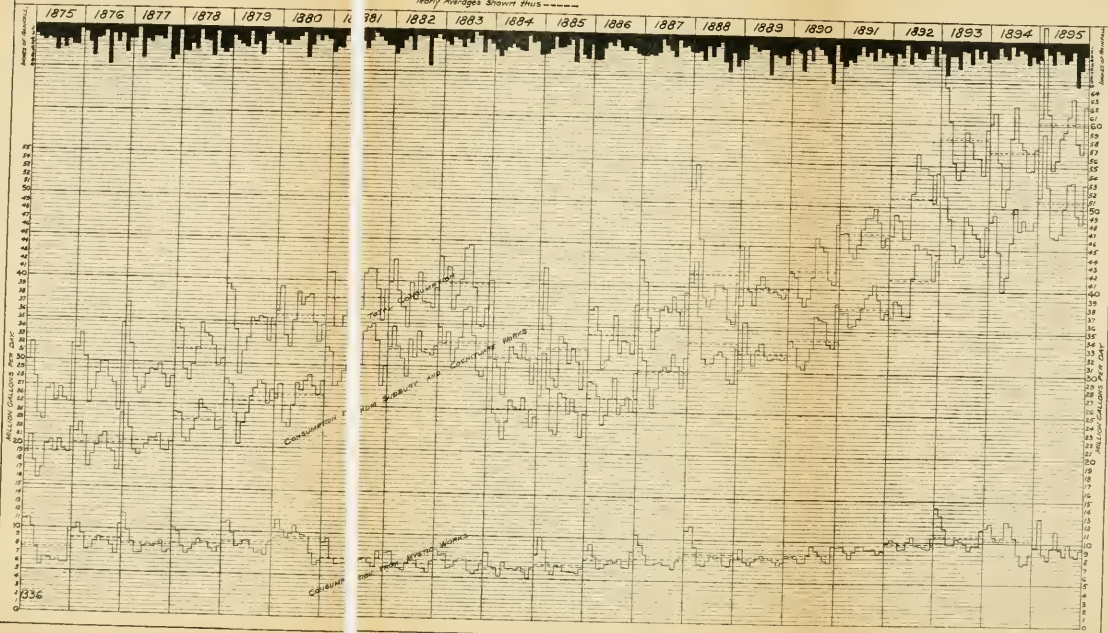
MONTH.	COCHITUATE WORKS.										MYSTIC WORKS.				
	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.
January	30,172,000	33,680,000	37,220,100	36,756,400	53,847,100	48,395,000	51,476,100	11,107,100	7,709,500	8,187,900	9,389,300	9,878,200	14,129,700	11,823,500	39,528,100
February	35,555,200	33,030,700	37,280,700	38,881,500	51,299,400	49,207,500	55,905,100	11,620,900	9,073,600	8,299,700	9,466,900	10,332,200	13,174,700	12,295,000	12,953,200
March	32,180,000	30,844,400	35,533,400	38,395,100	48,700,200	44,844,300	52,706,700	9,242,000	7,537,600	8,055,800	8,811,000	9,970,500	11,692,700	10,720,800	8,712,200
April	30,514,500	30,446,600	35,751,600	37,171,000	45,573,100	40,070,200	46,614,200	7,276,700	7,185,700	7,481,600	8,045,800	9,145,000	9,812,500	10,236,200	8,098,000
May	32,719,500	31,281,200	36,580,700	37,055,900	43,451,500	41,827,700	46,470,500	6,932,300	7,663,600	7,488,400	8,841,300	9,204,900	9,817,400	10,661,000	9,426,500
June	33,377,900	33,022,700	37,801,900	41,564,000	44,125,100	45,906,400	47,089,500	7,615,200	8,017,700	8,396,000	9,478,400	10,146,300	110,460,000	12,552,300	11,509,200
July	31,870,300	36,701,100	39,062,600	45,738,100	48,983,900	50,044,000	50,064,800	8,267,500	8,315,600	9,463,300	9,581,700	10,702,000	110,167,000	12,172,000	9,265,900
August	31,403,200	36,316,000	39,460,400	45,031,600	48,062,000	47,288,500	53,095,100	7,850,100	8,113,200	8,932,200	9,122,300	9,751,500	9,826,200	10,696,700	8,117,400
September	31,722,800	36,165,800	40,677,700	45,261,900	46,926,500	48,558,700	52,246,900	7,266,300	7,966,000	8,436,700	9,128,700	9,549,400	9,115,000	28,703,600	9,937,900
October	31,702,200	33,429,800	53,881,600	44,626,700	46,416,900	47,072,500	49,278,000	7,096,400	7,627,500	7,784,100	9,259,100	9,840,500	9,630,400	7,421,200	8,667,300
November	31,532,400	32,955,100	38,640,800	41,347,800	44,223,900	47,101,500	48,295,600	6,990,800	7,316,700	7,601,300	8,583,200	9,230,000	9,569,700	7,563,100	8,453,400
December	31,829,000	38,324,100	37,342,500	43,766,400	47,807,800	48,511,600	52,934,800	7,918,300	7,473,200	9,448,300	8,960,600	10,473,700	11,620,800	8,667,800	9,276,700
Yearly average .	32,070,000	33,871,700	37,686,900	41,312,400	47,453,200	46,560,000	50,801,100	8,258,400	7,830,500	8,301,400	9,055,200	9,810,800	10,742,500	10,282,100	9,457,000

¹ From June 7 to July 29 about 3,000,000 gallons per day were wasted from a blow-off.² After September 12 Charlestown was supplied with Cochituate water.³ Charlestown was supplied with Cochituate water from January 1 to February 6, February 21 to May 18, and July 13 to January 1, 1896.

BOSTON WATER WORKS.

Diagram showing the rainfall and daily average Consumption for each month.

Yearly Averages shown thus -----



1891 JULY 10

1891 JULY 10

1891 JULY 10

TABLE II.
Division of Sudbury-River Water, 1888-1895.

MONTH.	1888.		1889.		1890.		1891.		1892.		1893.		1894.		1895.	
	To Chestnut Hill Res'r.	Gallons.	To Lake Cochituate.	To Chestnut Hill Res'r.	To Chestnut Hill Res'r.	Gallons.	To Lake Cochituate.	To Chestnut Hill Res'r.	To Lake Cochituate.	To Chestnut Hill Res'r.	To Lake Cochituate.	To Chestnut Hill Res'r.	To Lake Cochituate.	To Chestnut Hill Res'r.	To Lake Cochituate.	To Chestnut Hill Res'r.
		Gallons.		Gallons.		Gallons.		Gallons.		Gallons.		Gallons.		Gallons.		Gallons.
January	894,400,000		484,500,000		518,600,000		715,900,000		630,800,000		1,325,900,000		1,012,000,000		1,300,000	1,186,100,000
February	906,700,000		564,600,000		475,000,000		560,800,000		610,400,000		957,600,000		944,000,000			1,318,400,000
March	691,400,000		554,500,000		498,600,000		573,200,000		45,100,000		1,023,900,000		947,100,000		680,000,000	1,115,800,000
April	468,800,000		490,500,000		417,000,000		641,900,000		545,000,000		917,000,000		725,600,000			982,300,000
May	566,300,000		615,700,000		536,300,000		740,300,000		114,700,000		858,600,000		826,500,000		87,700,000	931,500,000
June	489,000,000		567,600,000		513,100,000		629,500,000		137,500,000		856,700,000		80,700,000		114,000,000	941,100,000
July	528,900,000		534,000,000		664,100,000		755,100,000				1,040,800,000					1,061,900,000
August	626,600,000		443,700,000		625,500,000		722,900,000				994,100,000					1,147,600,000
September	581,600,000		475,500,000		606,400,000		732,400,000				948,300,000					1,142,800,000
October	435,900,000		414,100,000		539,900,000		715,300,000				956,600,000		1,100,000		6,600,000	951,700,000
November	410,900,000		454,800,000		526,000,000		752,200,000				862,700,000		400,000		5,600,000	998,600,000
December	605,200,000		501,200,000		675,500,000		767,100,000				995,700,000		1,000,000		1,600,000	1,130,700,000
Totals	7,224,700,000		293,400,000	6,130,500,000	6,596,000,000	8,306,600,000		902,300,000	9,633,200,000		11,737,900,000		962,200,000		896,800,000	12,805,300,000
Total diversion } from Sudbury } river.	7,224,700,000		6,368,900,000		6,596,000,000	8,306,000,000		10,535,500,000			11,737,900,000		12,412,800,000		13,805,300,000	
Average daily } diversion for } whole year.	19,739,600		17,435,300		18,071,200	22,757,800		28,800,000			32,158,600		34,007,700		37,822,700	

TABLE III.

Statement showing Amount of Water drawn from Lake Cochituate; Amount wasted; Amount of Rainfall collected in Lake; Amount received into Lake from Sudbury River; Percentage of Rainfall collected, etc., 1852 to 1895; Water-shed of Lake, 12,077 Acres.

YEAR.	Amount of Water drawn from Lake.	Amount of Water wasted from Lake.	Amount received into Lake from Sudbury River.	STORAGE.		Total Amount of Rainfall collected in Lake.	Daily average amount of Rain-fall collected in Lake.	Rainfall.	Rainfall collected.	Percentage of Rainfall collected.
				Gain.	Loss.					
	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Inches.	Inches.	Per cent.
1852 ¹	2,974,042,800	4,020,566,900	.....	.....	261,380,000	6,783,249,700	18,396,900	47.93	20.61	43.
1853	3,117,939,500	3,166,417,500	.....	239,580,000	.....	6,523,937,000	17,873,800	55.73	19.51	35.
1854	3,614,230,000	4,187,733,000	.....	.....	217,800,000	7,584,183,000	20,778,500	43.15	22.87	53.
1855	3,776,399,500	No account kept	.....	.....	326,700,000	.....	.....	34.96	.....	.....
1856	4,409,787,600	"	.....	598,950,000	.....	.....	.....	40.80	.....	.....
1857	4,644,990,000	10,625,900,000	.....	32,670,000	.....	15,303,560,000	41,927,600	63.10	46.69	74.
1858	4,689,155,000	1,964,500,000	.....	.....	141,570,000	6,482,085,000	17,759,000	48.66	19.46	40.
1859 ²	4,808,875,000	7,569,000,000	.....	283,140,000	.....	12,661,015,000	34,687,700	49.02	38.24	78.
1860	6,309,108,000	None.	.....	174,240,000	.....	6,483,348,000	17,714,100	55.44	19.40	35.
1861	6,639,095,900	3,377,559,000	.....	.....	1,459,260,000	8,557,394,900	23,444,900	45.44	25.45	56.
1862	6,059,000,000	33,200,000	.....	1,306,800,000	.....	7,399,000,000	20,271,200	49.69	22.36	45.
1863	5,927,052,500	2,165,696,500	.....	763,300,000	.....	8,855,049,000	24,260,400	69.30	26.88	39.
1864	6,105,306,700	1,368,746,000	.....	.....	1,848,577,000	5,625,475,700	15,370,200	42.00	18.35	43.
1865	4,621,630,000	1,688,120,700	.....	743,242,500	.....	7,052,993,200	19,323,300	49.45	20.50	41.
1866	4,463,585,000	None.	.....	743,242,500	.....	5,206,827,500	14,265,300	62.32	16.01	26.

1867	4,951,225,000	2,482,041,000	.....	.....	698,811,000	6,734,455,000	18,450,600	56.25	21.80	39.
1868	5,405,515,000	2,507,684,000	.....	346,371,000	.....	8,259,570,000	22,567,200	49.71	24.98	50.
1869	5,503,751,000	1,635,570,000	.....	480,882,000	.....	7,620,203,000	20,577,300	64.34	21.99	34.
1870	5,477,810,000	4,818,971,000	.....	.....	1,738,085,000	8,560,606,000	23,453,900	55.89	26.08	47.
1871	5,223,500,000	None.	.....	.....	250,933,000	4,972,567,000	13,623,500	45.39	15.16	33.
1872	5,775,151,200	None.	.....	1,676,666,400	1,543,995,500	5,642,480,300	15,416,600	48.47	17.22	35.
1873	6,511,826,900	2,917,977,000	.....	.....	515,132,000	8,914,671,900	24,423,800	45.43	27.13	60.
1874	6,623,979,900	1,145,851,700	.....	.....	1,307,715,000	6,402,109,600	17,540,000	35.93	19.52	54.
1875	7,092,955,500	None.	.....	2,555,800,000	1,222,885,000	5,760,040,500	15,780,900	45.49	17.57	39.
1876	7,277,175,200	1,619,243,800	.....	2,528,300,000	43,433,000	6,411,557,000	17,517,300	48.49	19.54	40.
1877	7,629,889,200	1,484,978,600	.....	1,894,350,000	378,127,000	7,596,244,800	20,811,600	43.80	23.17	53.
1878	7,743,904,700	3,341,875,000	.....	2,608,300,000	219,789,000	8,637,268,700	23,563,700	53.58	26.34	49.
1879	6,051,835,900	1,523,361,400	.....	411,300,000	.....	5,841,203,000	16,003,300	38.01	17.81	47.
1880	4,284,147,100	65,577,700	.....	823,700,000	.....	3,376,759,800	9,226,100	35.83	10.30	29.
1881	2,846,459,700	2,231,016,700	.....	187,600,000	468,089,400	5,357,965,800	14,679,400	41.09	16.34	40.
1882	3,935,490,600	1,358,543,700	.....	.....	.....	4,936,699,600	13,525,200	40.29	15.05	37.
1883	4,731,227,700	162,361,800	.....	1,245,100,000	.....	3,314,089,500	9,079,700	31.20	10.11	32.
1884	4,539,150,450	1,842,837,100	.....	1,416,300,000	1,340,436,700	6,300,130,250	17,213,450	45.57	19.21	42.
1885	4,091,674,900	1,006,622,800	.....	.....	8,594,800	5,106,892,500	13,991,500	43.66	15.57	36.
1886	4,432,530,100	3,116,283,200	.....	.....	.....	7,188,157,300	19,663,600	46.97	21.92	47.
1887	4,802,120,700	3,658,652,900	.....	.....	763,205,000	7,697,568,600	21,089,200	41.58	23.47	56.

¹ Observations of rainfall at Lake Cochituate commenced 1852, and these observations are assumed as correct for the whole district.

² Lake raised two feet.

TABLE III. — *Concluded.*

Statement showing Amount of Water drawn from Lake Cochituate; Amount wasted; Amount of Rainfall collected in Lake; Amount received into Lake from Sudbury River; Percentage of Rainfall collected, etc., 1852 to 1895; Water-shed of Lake, 12,077 Acres.

YEAR.	Amount of Water drawn from Lake.	Amount of Water wasted from Lake.	Amount received into Lake from Sudbury River.	STORAGE.		Total Amount of Rainfall collected in Lake.	Daily average amount of Rainfall collected in Lake.	Rainfall.	Rainfall collected.	Percentage of Rainfall collected.
				Gain.	Loss.					
	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Inches.	Inches.	Per cent.
1888	4,968,503,100	4,220,200,000	. . . . .	950,300,000	. . . . .	10,157,012,100	27,751,400	56.93	30.97	54.
1889	5,570,423,600	3,373,929,000	233,400,000	454,766,800	. . . . .	9,165,719,400	25,111,500	50.23	27.95	56.
1890	5,722,170,800	2,380,441,200	. . . . .	. . . . .	64,166,300	8,038,445,700	22,023,100	51.23	24.51	48.
1891	5,508,178,900	6,064,000,000	. . . . .	. . . . .	1,056,057,800	10,516,121,100	28,811,300	46.42	32.07	69.
1892	5,464,791,300	251,000,000	902,300,000	200,284,300	. . . . .	5,033,775,600	13,753,500	39.04	15.35	39.
1893	5,623,532,500	255,300,000	. . . . .	. . . . .	89,200,000	5,789,632,500	15,862,000	45.28	17.65	39.
1894	5,520,092,100	None.	962,200,000	. . . . .	296,900,000	4,200,992,100	11,674,000	39.08	12.99	33.
1895	5,654,765,700	637,600,000	896,800,000	1,200,400,000	. . . . .	6,615,965,700	18,125,934	48.96	20.17	41.
Averages . .	5,252,613,300	2,245,199,000	. . . . .	. . . . .	. . . . .	7,111,359,300	13,471,800	47.54	21.63	45.

TABLE IV.

Statement showing Amount of Water diverted from Sudbury River to Lake Cochituate and Chestnut Hill Reservoir; Amount wasted, Amount of Flow in River; Percentage of Rainfall collected, etc., 1875 to 1895.

(Water-shed from 1875 to 1878, inclusive, = 77,764 sq. miles; in 1879 and 1880 = 78,238 sq. miles; and from 1881 to 1893, inclusive, = 75.2 sq. miles.)

YEAR.	Amount of Water diverted to Lake Cochituate and Chestnut Hill Reservoir.	Amount of Water used by Framingham Water Co.	Amount of Water wasted from River.	STORAGE.		Total Amount of Flow in River.	Daily average Amount of Flow in River.	Rainfall.	Rainfall collected.	Percentage of Rainfall collected.
				Gain.	Loss.					
	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Inches.	Inches.	Per cent.
1875	2,555,800,000	. . . . .	24,971,600,000	66,300,000	. . . . .	27,593,700,000	75,599,200	45.490	20.418	44.88
1876	2,528,300,000	. . . . .	29,942,300,000	. . . . .	160,700,000	32,309,900,000	88,278,400	49.563	28.908	48.24
1877	1,894,350,000	. . . . .	32,438,300,000	112,100,000	. . . . .	34,444,750,000	94,368,200	44.018	25.847	57.90
1878	3,422,100,000	. . . . .	37,125,200,000	654,700,000	. . . . .	41,202,000,000	112,882,200	57.931	30.487	52.63
1879	3,749,200,000	. . . . .	20,817,500,000	962,200,000	. . . . .	25,628,900,000	69,942,200	41.419	18.775	45.33
1880	6,230,200,000	. . . . .	11,290,000,000	. . . . .	958,600,000	16,561,600,000	42,250,300	38.177	12.182	31.91
1881	8,845,300,000	. . . . .	17,279,000,000	751,700,000	. . . . .	26,876,000,000	73,633,900	44.160	20.565	46.56
1882	7,785,200,000	. . . . .	16,273,900,000	. . . . .	352,600,000	23,656,600,000	64,812,300	39.394	18.102	45.95
1883	8,455,000,000	. . . . .	7,251,900,000	. . . . .	1,086,400,000	14,620,500,000	40,056,200	32.780	11.188	34.13
1884	6,110,600,000	. . . . .	23,228,900,000	1,741,600,000	. . . . .	31,084,100,000	84,929,200	47.135	23.784	50.46
1885	5,224,700,000	61,800,000	19,878,800,000	. . . . .	446,900,000	24,718,400,000	67,721,600	43.545	18.916	43.44
1886	5,266,600,000	76,600,000	23,023,000,000	1,461,500,000	. . . . .	29,831,700,000	81,730,700	46.065	22.825	49.55
1887	6,124,100,000	87,500,000	25,334,500,000	117,400,000	. . . . .	31,653,500,000	86,749,300	42.705	24.227	56.73
1888	7,224,700,000	61,500,000	39,040,500,000	390,600,000	. . . . .	46,717,300,000	127,642,900	57.465	35.749	62.21

TABLE IV.—*Concluded.*

Statement showing Amount of Water diverted from Sudbury River to Lake Cochituate and Chestnut Hill Reservoir; Amount wasted; Amount of Flow in River; Percentage of Rainfall collected, etc., 1875 to 1895.

(Water-shed from 1875 to 1878 inclusive, = 77,764 sq. miles; in 1879 and 1880 = 78,238 sq. miles; and from 1881 to 1893, inclusive, = 75.2 sq. miles.)

YEAR.	Amount of Water diverted to Lake Cochituate and Chestnut Hill Reservoir.	Amount of Water used by Framingham Water Co.	Amount of Water wasted from River.	STORAGE.		Total Amount of Flow in River.	Daily average Amount of Flow in River.	Rainfall.	Rainfall collected.	Percentage of Rainfall collected.
				Gain.	Loss.					
	<i>Gallons.</i>	<i>Gallons.</i>	<i>Gallons.</i>	<i>Gallons.</i>	<i>Gallons.</i>	<i>Gallons.</i>	<i>Gallons.</i>	<i>Inches.</i>	<i>Inches.</i>	<i>Per cent.</i>
1889	6,363,900,000	59,500,000	31,550,400,000	. . . . .	. . . . .	37,971,000,000	104,030,100	49.95	29.056	58.17
1890	6,596,000,000	74,500,000	28,667,100,000	. . . . .	. . . . .	35,280,200,000	96,658,100	53.00	26.998	50.94
1891	8,306,600,000	80,500,000	28,799,600,000	. . . . .	. . . . .	36,085,900,000	98,865,500	49.52	27.612	55.76
1892	10,535,500,000	82,800,000	11,143,000,000	. . . . .	. . . . .	21,503,600,000	58,753,000	41.83	16.456	39.34
1893	11,737,900,000	103,000,000	17,405,500,000	. . . . .	. . . . .	28,456,600,000	77,963,300	48.225	21.774	45.15
1894	12,412,800,000	117,000,000	6,715,900,000	1,901,600,000	. . . . .	21,147,300,000	57,937,800	39.740	16.182	40.72
1895	13,805,300,000	132,200,000	15,545,600,000	1,137,920,000	. . . . .	31,621,000,000	86,632,900	50.62	24.196	47.80
Averages,	6,910,721,400	88,172,700	22,272,369,700	. . . . .	. . . . .	29,470,078,600	78,220,000	45.845	22.326	47.99

TABLE V.
Statement showing Amount of Water drawn from Mystic Lake; Amount wasted; Amount of Rainfall collected in Lake; Percentage of Rainfall collected, etc., 1876 to 1895; Water-shed of Lake, 17,200 Acres.

YEAR.	Amount of Water drawn from Lake.	Amount of Water wasted from Lake.	STORAGE.		Total Amount of Rainfall collected in Lake.	Daily average amount of Rainfall collected in Lake.	Rainfall.	Rainfall collected.	Percentage of Rainfall collected.
	Gallons.	Gallons.	Gain.	Loss.	Gallons.	Gallons.	Inches.	Inches.	Per cent.
1876	3,230,101,300	6,309,774,700	. . . . .	32,533,000	9,567,233,000	26,140,100	47.00	20.49	43.6
1877	3,069,554,800	7,250,223,500	. . . . .	16,291,400	10,303,486,900	28,228,700	43.095	22.06	51.2
1878	3,367,490,400	8,718,547,600	. . . . .	26,000,000	12,060,038,000	33,041,200	54.065	25.82	47.8
1879	3,490,848,200	4,625,691,800	. . . . .	203,000,000	7,913,540,000	21,680,900	35.30	10.94	43.0
1880	3,692,195,700	2,158,761,200	. . . . .	116,500,000	5,703,756,900	15,584,000	34.42	12.21	35.5
1881	2,815,579,900	5,534,300,000	371,200,000	. . . . .	8,721,079,900	23,893,400	41.91	18.07	44.5
1882	2,570,896,700	4,444,608,000	15,000,000	. . . . .	7,030,594,700	19,261,800	39.165	15.05	38.4
1883	2,664,514,200	2,034,702,600	. . . . .	347,579,000	4,351,637,800	11,922,300	31.22	9.32	29.84
1884	2,469,761,000	6,574,003,800	380,600,000	. . . . .	9,424,364,800	25,749,600	44.39	20.18	45.46
1885	2,039,278,800	5,558,860,500	. . . . .	33,200,000	8,194,939,300	22,451,900	44.50	17.55	39.43
1886	2,862,947,500	7,743,258,900	. . . . .	28,400,000	10,577,806,400	28,980,300	45.56	22.65	49.71
1887	2,954,257,500	7,414,213,000	. . . . .	11,000,000	10,357,470,500	28,376,000	46.42	22.17	47.77
1888	3,205,121,100	11,334,503,100	. . . . .	6,000,000	14,533,714,200	39,709,600	56.745	31.12	54.84
1889	3,007,539,800	8,879,787,500	12,000,000	. . . . .	11,899,327,300	32,600,900	50.395	25.48	50.56
1890	3,212,284,500	8,953,727,900	. . . . .	3,000,000	12,163,012,400	33,323,300	49.37	20.04	52.75
1891	3,500,817,500	10,027,714,400	. . . . .	171,000,000	13,337,531,900	36,600,000	47.40	28.60	60.84
1892	3,811,766,200	3,474,213,200	177,000,000	. . . . .	7,402,979,400	20,390,700	39.115	15.98	40.85
1893	4,331,743,200	4,958,528,500	. . . . .	95,000,000	9,195,271,700	25,192,500	44.20	19.69	44.54
1894	3,996,805,100	2,752,964,200	. . . . .	23,000,000	6,726,769,300	18,429,500	39.24	14.40	36.70
1895	3,455,460,300	4,528,156,200	156,000,000	. . . . .	8,139,616,500	22,300,300	48.73	17.42	35.76
Averages	3,217,448,200	6,108,334,500	. . . . .	. . . . .	9,384,210,000	25,692,700	44.11	20.09	44.88

TABLE VII.

Statement of Operations of Engines 1 and 2 at the Chestnut Hill Pumping-Station for 1895.

1895.	ENGINE NO. 1.		ENGINE NO. 2.		Total amount pumped, % allowed for slip.	Daily average amount pumped.	Total amount of coal consumed.	Total ashes and clinkers.	Quantity pumped per lb. of coal. No correction for heating or lighting.	Quantity pumped per lb. of coal. Corrected for heating and lighting.	Average lift in feet.	DIVISION OF COAL.			Duty in Ft.-lbs. per 100 lbs. of coal.		Water evaporated in boilers per lb. of coal.			
	Total pumping time.		Gallons.	Gallons.								Heating.	Lighting.	Pumping.	Without correction for heating and lighting.	Corrected for heating and lighting.				
	Hrs.	Mins.																		
Month.	Hrs.	Mins.	Gallons.	Gallons.	Lbs.	Lbs.	Lbs.	Lbs.	Gals.	Gals.	Ft.	Lbs.	Lbs.	Lbs.	Ft.-lbs.	Ft.-lbs.	Lbs.			
January .	355 50	151,821,750	419 05	175,879,000	327,700,750	10,501,000	451,537	14,566	35,370	7.8	725.7	824.7	125.90	27,229	26,942	397,366	76,203,800	86,592,100	9.37	11.07
February,	450 42	196,706,000	267 15	114,778,600	311,484,600	11,124,500	415,592	14,843	34,453	8.3	749.5	833.7	121.12	25,453	16,500	373,639	75,709,700	84,210,500	9.15	10.84
March . .	228 05	97,681,875	472 20	208,815,750	306,497,625	9,887,000	417,205	13,458	34,151	8.2	734.8	806.5	121.11	22,188	14,983	380,034	74,205,100	81,461,200	9.27	10.94
April . .	583 10	250,460,900	26 20	10,788,150	261,249,050	8,708,300	346,618	11,554	36,026	10.4	753.7	819.6	122.01	10,459	17,400	318,759	76,694,600	83,397,600	8.82	10.37
May . . .	296 20	138,703,100	250 20	106,335,850	245,088,950	8,753,200	328,020	10,581	37,020	11.3	747.2	782.0	122.85	. .	14,592	313,428	76,553,400	80,117,500	9.17	10.69
June . .	111 20	43,203,650	20 45	7,827,825	51,036,475	10,207,300	56,424	11,285	5,396	9.6	904.5	. .	120.0	. .	. .	. .	90,524,100	. .	. .	. .
July . . .	200 45	72,033,100	90 20	28,598,775	100,631,875	10,063,200	111,583	11,158	10,332	9.2	901.9	. .	120.04	. .	. .	. .	90,287,900	. .	. .	. .
August .	170 40	62,891,050	65 00	22,594,050	85,485,100	10,685,600	88,825	12,689	7,652	8.5	962.4	. .	119.91	. .	. .	. .	96,244,700	. .	. .	. .
Septem'ar,	719 40	269,721,500	239 50	88,901,200	358,622,700	11,954,100	396,435	13,214	38,468	9.7	904.6	. .	119.98	. .	. .	. .	90,519,200	. .	. .	. .
October .	727 25	274,591,900	240 10	88,706,500	363,298,400	11,719,300	432,224	13,943	41,966	9.7	840.5	. .	120.74	. .	. .	. .	84,639,300	. .	. .	. .
Novemb'r,	454 10	166,109,780	171 00	58,631,250	224,741,030	10,702,000	282,757	12,761	28,194	10.0	791.9	. .	120.15	. .	. .	. .	79,645,100	. .	. .	. .
December,	43 05	15,303,125	22 00	7,311,575	22,614,700	7,538,200	36,255	12,085	3,324	9.2	623.8	. .	120.31	. .	. .	. .	62,587,960	. .	. .	. .
Totals and averages,	4,341 12	1,739,232,730	2,285 35	919,218,525	2,658,451,255	10,384,600	3,303,475	13,139	312,352	9.3	790.4	. .	121.18	. .	. .	. .	79,879,750	. .	. .	. .

TABLE VII.
Statement of Operations at the Chestnut Hill Pumping-Station for 1895. — (Concluded.)

1895.	ENGINE No. 3.										SUMMARY. Engines 1, 2, and 3.		
	Total pumping time.	Amount pumped.	Daily average.	Amount of coal consumed.	Daily average amount.	Amount of ashes and clinkers.	Per ct. of ashes and clinkers.	Amount pumped per lb. of coal.	Aver'ge lift of water.	Duty in ft.-lbs. per 100 lbs. of coal.	Total amount pumped.	Daily average amount.	Remarks.
Month.	Hrs. Min	Gallons.	Gallons.	Lbs.	Lbs.	Lbs.	Per cent.	Galls.	Feet.		Gallons.	Gallons.	
January .	17 00	16,128,150	2,638,000	30,265	5,000	3,400	11.2	532.9	124.0	55,110,200	343,828,900	11,091,300	
February .	22 30	16,326,225	2,332,300	30,255	4,300	4,780	15.3	539.5	124.44	56,003,430	327,810,800	11,707,500	
March . .	32 40	28,075,350	4,010,800	38,623	5,200	5,240	14.3	766.6	125.46	80,212,700	334,573,000	10,792,700	
April . . .	67 47	53,523,270	3,148,400	84,040	4,900	12,690	15.1	636.9	131.04	69,602,800	314,772,300	10,492,400	
May . .	125 51	102,843,280	7,345,950	95,733	6,800	14,230	14.9	1,074.3	124.0	111,096,900	347,932,200	10,901,000	
June . . .	336 22	289,437,400	11,132,200	236,394	9,150	30,732	13.0	1,224.8	123.73	126,345,400	340,473,900	11,349,100	
July . . .	274 55	238,614,900	10,846,100	214,656	9,800	22,825	10.6	1,111.6	124.15	115,097,900	339,246,800	10,943,400	
August . .	307 37	203,589,300	11,191,200	250,029	10,400	27,593	11.0	1,074.2	125.14	112,114,200	354,074,400	11,421,800	
September	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	358,922,700	11,954,100	Engine No. 3 was idle.
October . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	363,298,400	11,719,300	Engine No. 3 was idle.
November	153 22	136,024,500	11,335,400	148,095	12,300	13,060	12.2	913.5	125.84	96,390,600	360,765,530	12,025,500	
December	455 12	357,775,900	12,337,100	377,251	13,000	48,396	12.8	948.4	124.68	98,615,200	380,390,600	12,270,700	
Totals & averages }	1,793 16	1,507,338,275	9,191,100	1,503,331	9,200	187,951	12.5	1,002.6	125.25	104,737,900	4,165,789,530	11,413,100	

TABLE VIII.
Statement of Operations at the Mystic Pumping-Station for 1895.

1895.	ENGINE No. 1.			ENGINE No. 2.			ENGINE No. 3.			ENGINE No. 4.			Total amount pumped.	Daily average amount pumped.	Total amount of coal consumed.	Daily average amount of coal.	Total ashes and clinkers.	Per cent. ashes and clinkers.	Quantity pumped per pound of coal.	
	Total pumping time.		Amount pumped.	Total pumping time.		Amount pumped.	Total pumping time.		Amount pumped.	Total pumping time.		Amount pumped.								
	Hrs.	Min.		Gallons.	Hrs.		Min.	Gallons.		Hrs.	Min.									Gallons.
Month.	Hrs.	Min.	Gallons.	Hrs.	Min.	Gallons.	Hrs.	Min.	Gallons.	Hrs.	Min.	Gallons.	Hrs.	Min.	Gallons.	Lbs.	Lbs.	Lbs.	Per ct.	Gals.
January . . .	727	15	163,276,300	646	30	132,789,400	. . .	. . .	. . .	. . .	. . .	296,065,700	9,550,500	801,000	25,839	85,385	10.7	369.6
February . .	369	00	81,373,900	456	30	98,270,800	539	30	183,654,400	. . .	. . .	363,299,100	12,975,000	954,500	34,089	92,476	9.7	380.6
March	59	00	13,001,100	. . .	. . .	. . .	739	15	257,177,600	. . .	. . .	270,178,700	8,715,400	656,500	21,177	71,322	10.9	411.5
April	122	30	29,580,900	72	45	15,704,000	572	30	197,785,600	. . .	. . .	243,070,500	8,102,400	567,000	18,900	62,089	10.9	428.7
May	506	00	115,545,200	103	00	23,978,800	454	15	152,755,200	. . .	. . .	292,270,200	9,428,400	691,500	22,306	76,732	11.1	422.7
June	512	00	107,930,100	. . .	. . .	. . .	720	00	236,774,400	. . .	. . .	344,754,500	11,491,800	780,500	26,016	85,865	11.0	441.7
July	383	30	85,103,600	114	00	24,462,000	528	45	177,996,800	. . .	. . .	287,562,400	9,276,200	685,500	22,113	72,316	10.5	419.5
August	43	45	10,479,400	. . .	. . .	. . .	702	45	236,620,800	11	30	3,755,300	8,092,100	561,500	18,113	61,296	10.9	446.8
September . .	249	00	54,511,000	. . .	. . .	. . .	676	15	239,886,400	36	15	13,608,600	9,966,900	676,000	22,533	79,343	11.7	442.3
October	145	00	32,193,200	. . .	. . .	. . .	602	30	209,664,000	58	30	26,613,000	8,660,300	606,500	19,564	72,224	11.9	442.6
November . . .	8	15	3,110,600	. . .	. . .	. . .	634	45	216,876,500	76	00	32,905,300	8,429,700	545,000	18,166	59,823	10.9	464.0
December . . .	116	45	24,568,000	. . .	. . .	. . .	506	10	175,999,500	197	45	86,822,000	9,270,600	595,500	19,209	65,445	10.9	504.6
Totals and averages.	3,240	00	720,723,300	1,392	45	295,205,000	6,676	40	2,276,190,200	380	00	163,704,200	9,468,000	8,121,000	22,249	884,316	10.9	425.5		

TABLE IX.

Statement of Operations at the East Boston Pumping-Station for the Year 1895.

1895.	ENGINES NOS. 1 AND 2.				ENGINE No. 3.				Total amount of coal consumed.	Per cent. of ashes and clinkers.
	Total pump- ing time.		Total amount pumped to reservoir.	Daily average.	Total pump- ing time.		Total amount pumped to tank.	Daily average.		
Month.	Hrs.	M.	Gallons.	Gallons.	Hrs.	M.	Gallons.	Gallons.	Lbs.	Per ct.
Jan. .	373	15	14,869,540	479,700	54	25	844,020	27,200	43,900	19.1
Feb. .	410	50	17,078,320	609,900	68	45	1,035,420	37,000	48,750	18.9
March,	374	05	15,328,600	494,500	53	10	816,000	26,300	43,540	18.8
April .	322	50	13,316,800	443,900	53	25	770,160	25,700	36,380	17.8
May .	345	00	14,254,520	459,900	68	15	961,020	31,000	36,150	18.1
June .	334	05	13,663,580	455,500	88	15	1,315,440	43,800	36,100	18.0
July .	336	15	13,821,500	445,900	95	00	1,407,780	45,400	36,630	18.1
Aug. .	334	45	13,868,820	447,400	105	45	1,594,260	51,400	37,700	18.0
Sept. .	296	15	12,116,440	403,900	96	20	1,443,300	48,100	35,200	18.3
Oct. .	323	30	13,653,920	440,400	91	15	1,288,440	41,600	35,700	18.2
Nov. .	325	00	13,011,880	433,700	88	45	1,169,520	39,000	34,870	18.0
Dec. .	355	25	14,915,460	481,100	116	35	1,693,020	54,600	43,600	18.3
Totals,	4,137	15	169,899,380	465,500	979	55	14,338,380	39,300	468,520	18.4

Engines Nos. 1 and 2 pump to the reservoir.

Engine No. 3 pumps to the tank on Breed's Island.

TABLE X.

Statement of Operations at the West Roxbury Pumping-Station for the Year 1895.

1895.	Total pumping time.		Total amount pumped.	Daily average amount pumped.	Quantity pumped per lb. of coal.	Total amount of coal consumed.	Per cent. of ashes and clinkers.	Average lift.
	Hours.	Min.	Gallons.	Gallons.	Gallons.	Lbs.	Per cent.	Feet.
January . .	390	30	4,611,675	148,700	145.5	31,700	18.6	135.39
February .	410	30	4,783,275	170,800	157.5	30,375	17.1	134.07
March . . .	399	30	4,706,400	151,800	152.6	30,850	17.3	134.83
April . . .	357	00	4,270,200	142,300	162.1	26,350	16.3	136.60
May	395	00	5,019,825	161,900	172.1	29,175	17.4	136.57
June	583	00	6,465,600	215,500	162.8	39,425	20.4	138.88
July	446	30	5,617,950	181,200	166.1	33,825	18.2	138.60
August . .	494	30	6,344,175	204,700	162.7	39,000	18.4	138.09
September .	471	30	6,169,950	205,700	161.0	38,325	19.4	142.52
October . .	440	00	5,783,475	186,600	155.9	37,100	18.4	148.53
November .	410	00	5,540,250	184,700	165.6	33,450	16.8	142.67
December .	462	00	6,102,975	196,900	157.1	38,850	17.3	140.83
Totals and Averages. }	5,260	00	65,415,750	179 200	160.2	408,425	18.1	138.97

TABLE XI.

Table showing Work done at the Mystic Sewage Pumping-Station during the year 1895.

1895.	Pumping time.		Amount of sewage pumped and treated.	Sulphate aluminum used.	Coal used.	Daily average amount of sewage pumped and treated.
	Hrs.	Min.	Gallons.	Lbs.	Lbs.	Gallons.
January	543	05	13,289,800	25,360	32,400	428,700
February	472	55	10,492,100	21,560	28,100	388,600
March	523	00	13,670,000	25,740	32,500	441,000
April	474	45	10,254,800	20,470	28,300	353,600
May	464	05	9,529,400	20,085	28,200	352,900
June	390	11	7,296,900	17,775	23,500	304,000
July	279	45	5,480,500	12,550	16,200	322,400
Totals	3,147	46	70,013,500	143,540	189,200	376,400

Total number of days engine worked, 186.

Plant turned over to the Metropolitan Sewerage Commission on July 19, 1895.

TABLE XII.

Rainfall in Inches and Hundredths on Sudbury River Water-shed for the Year 1895.

1895.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1 . . . . .	...	...	...	...	...	0.35	...	...	...	...	1.18	...
2 . . . . .	...	0.150	0.620	...	...	...	...	0.10	...	...	...	0.30
3 . . . . .	...	...	...	0.370	...	...	...	...	...	...	0.50	...
4 . . . . .	...	0.140	0.110	...	...	...	0.36	...	...	...	...	...
5 . . . . .	...	...	...	...	...	...	...	...	...	...	...	0.94
6 . . . . .	...	...	0.100	...	...	0.545	0.825	...	...	...	...	...
7	0.585	...	...	...	...	...	...	1.355	...	...	...	...
8 . . . . .	...	1.055	0.835	...	...	...	...	...	0.155	...	...	...
9	0.255	...	...	...	0.045	...	0.51	...	0.69	...	...	...
10 . . . . .	...	...	...	1.320	...	...	...	...	...	...	0.155	...
11	1.065	...	...	...	...	...	...	...	...	...	...	...
12 . . . . .	...	...	0.030	...	...	...	...	0.27	0.56	...	...	...
13	0.065	...	...	...	0.680	0.08	0.46	...	...	...	...	0.01
14 . . . . .	...	...	0.750	2.755	...	...	0.065	...	...	7.995	...	...
15 . . . . .	...	...	...	...	0.560	0.015	...	...	...	0.04	2.465	...
16	0.475	...	0.120	0.095	...	...	0.065	...	...	...	...	...
17 . . . . .	...	...	...	...	...	...	...	...	...	...	0.87	...
18	0.205	...	...	...	0.235	...	...	1.13	0.14	...	...	...
19 . . . . .	...	...	...	...	...	...	...	...	...	...	...	...
20 . . . . .	...	...	...	...	...	...	...	0.12	...	...	0.07	...
21 . . . . .	...	...	...	...	...	...	0.41	...	...	...	0.37	...
22	0.255	0.050	...	0.185	...	0.03	...	...	...	...	...	0.915
23 . . . . .	...	...	...	...	...	...	...	...	...	...	...	...
24 . . . . .	...	...	...	...	...	...	...	0.005	...	...	0.205	...
25 . . . . .	...	...	0.145	0.015	...	0.555	...	...	...	...	0.185	...
26	0.995	...	...	...	0.055	...	...	...	0.335	...	1.805	...
27 . . . . .	...	...	...	0.295	0.315	...	0.13	...	...	...	...	0.41
28 . . . . .	...	...	0.185	...	...	...	...	...	...	0.055	...	...
29	0.160	...	...	...	...	1.115	...	0.28	...	...	...	...
30 . . . . .	...	...	0.085	0.215	...	0.080	2.215	...	0.575	...	...	...
31 . . . . .	...	...	...	...	0.130	...	...	0.89	...	1.255	...	0.775
Totals .	4.060	1.395	2.980	5.250	2.020	2.770	5.040	4.150	2.300	9.500	7.805	3.350

Total rainfall during the year, 50.62 inches, being an average of two gauges located at Framingham and Ashland.

TABLE XIII.

Rainfall in Inches and Hundredths at Lake Cochituate for the Year 1895.

1895.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1.											1.14	
2.		0.16	0.61					0.09			0.50	0.27
3.				0.38								
4.		0.11	0.10		0.08		0.32					
5.												0.83
6.			0.09			0.37	0.55					
7.	0.52							1.67				
8.		1.38	0.91		0.04					0.25		
9.	0.20			1.01			0.51		0.59		0.15	
10.				0.16								
11.	1.07								1.17			
12.			0.03		0.66			0.32				
13.	0.07					0.14	0.39			6.95		
14.			0.77				0.18					
15.				2.79	0.59					0.04	2.37	
16.	0.48		0.11	0.04	0.02		0.06					
17.											0.86	
18.	0.19				0.21			1.09	0.12			
19.												
20.								0.02			0.47	
21.		0.05				0.03						
22.	0.26			0.18								0.57
23.												
24.						0.39					0.18	
25.			0.15			0.15						
26.	0.98				0.09				0.30		1.79	
27.				0.25	0.17		0.13			0.06		0.32
28.			0.26			0.91						
29.	0.16		0.08					0.10				
30.				0.22		1.13	2.57		0.59			
31.					0.17			0.67		1.13		0.72
Totals . .	3.93	1.70	3.11	5.03	2.03	3.12	4.71	3.96	2.77	8.43	7.46	2.71

Total rainfall during the year, 48.96 inches.

TABLE XIV.

Rainfall in Inches and Hundredths on Mystic Lake Water-shed for the Year 1895.

1895.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1.						0.04	0.25				1.405	
2.		0.110	0.600					0.115			0.585	0.21
3.				0.365								
4.		0.110			0.260	0.225	0.18					
5.			0.095									
6.			0.095		0.585	0.09	0.225					0.64
7.	0.425							2.55				
8.		0.425	0.800							0.265		
9.	0.220		0.010	0.785			0.61					
10.				0.100							0.16	
11.	0.965											
12.								0.175	1.305			
13.	0.095				1.255	0.685						
14.			0.790				0.76			7.025		
15.				2.190	0.470					0.075	2.210	
16.	0.410		0.090	0.060								
17.							0.04				0.80	
18.					0.22			1.99	0.085			
19.	0.150											
20.								0.025			0.485	
21.		0.010									0.185	
22.	0.245		0.030	0.210	0.035	0.04	0.08					0.56
23.												
24.								0.01			0.435	
25.			0.160	0.065		0.40			0.060			
26.	0.900		0.025		0.09			0.01	0.030		0.155	
27.				0.215					0.175	0.075	1.245	0.355
28.			0.205		0.235		0.215					
29.	0.125		0.060					0.045				
30.			0.040	0.195		2.150	1.985		0.385			
31.								0.515		1.350		0.535
Totals . .	3.535	0.655	3.000	4.185	3.150	3.630	4.345	5.435	2.040	8.790	7.665	2.300

Total rainfall during the year, 48.73 inches, being an average of two gauges, located at Mystic Lake and Mystic Reservoir.

TABLE XV.
Monthly Rainfall in Inches, during 1895, at Various Places in Eastern Massachusetts.

PLACE.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Framingham	3.88	1.45	2.95	5.38	1.94	3.23	5.17	4.00	2.19	10.07	7.94	3.20	51.40
Dam 4, Ashland	4.24	1.34	3.01	5.12	2.10	2.31	4.91	4.30	2.41	8.93	7.67	3.50	49.84
Cordaville	4.06	1.77	2.95	5.33	2.19	3.10	4.63	4.38	2.27	9.38	7.47	3.48	51.01
Lake Cochituate	3.93	1.70	3.11	5.03	2.03	3.12	4.71	3.96	2.77	8.43	7.46	2.71	48.96
Chestnut Hill	3.91	.88	2.91	4.60	2.58	2.21	3.55	3.91	2.15	9.21	7.69	2.33	45.93
Mystic Lake	3.84	.88	3.15	4.46	2.71	3.51	4.66	5.31	2.23	9.24	7.95	1.96	49.90
Winchester	3.23	.43	2.85	3.91	3.59	3.75	4.03	5.56	1.85	8.34	7.38	2.64	47.56
Mystic Pumping-station	3.62	.75	2.85	4.28	2.54	3.14	4.04	5.29	1.53	9.27	7.47	2.17	46.95
Cambridge Observatory	3.85	1.23	2.66	3.58	1.98	2.73	3.35	3.90	2.14	7.10	8.84	2.19	43.55
Waltham, Boston Manufacturing Co.	4.08	1.29	3.01	4.67	2.03	3.67	4.04	4.92	2.55	11.08	6.17	2.61	50.12
Lowell, Locks and Canals Co.	3.30	1.47	2.66	4.57	1.68	2.63	2.66	2.02	2.23	6.67	8.16	2.68	40.73
Average of above eleven places	3.81	1.19	2.92	4.63	2.31	3.04	4.16	4.32	2.21	8.88	7.65	2.67	47.81

TABLE XVI.

Table showing the Temperature of Air and Water at Various Stations on the Water-Works.

1895.	TEMPERATURE OF AIR.						TEMPERATURE OF WATER.	
	Chestnut-Hill Reservoir.			Frammingham.			Brookline Reservoir.	Mystic Engine-House.
	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.	Mean.	Mean.
January	50.0	2.0	26.3	49.0	-4.0	23.4	37.0	28.2
February	44.5	-8.5	22.4	45.0	-13.0	20.1	36.0	23.8
March	53.5	11.5	34.2	52.0	11.0	32.5	37.0	34.3
April	82.0	24.0	46.1	79.0	22.0	45.1	44.6	47.1
May	94.0	27.5	61.2	92.0	26.0	59.8	59.1	61.2
June	94.0	46.0	69.1	93.0	43.0	67.8	69.4	69.5
July	93.0	48.0	69.1	93.0	44.0	67.1	71.3	70.8
August	92.0	47.5	70.4	87.0	40.0	67.9	72.9	71.2
September	96.0	38.0	65.3	96.0	34.0	63.8	70.0	67.4
October	71.0	21.0	47.4	69.0	22.0	47.0	55.9	48.8
November	73.5	14.5	43.9	73.0	16.0	43.8	46.4	46.2
December	63.0	6.0	33.3	60.0	6.0	33.4	38.1	36.2

Note. — The maximum and minimum air temperatures in above table are the highest and lowest temperatures in any one day of the month. The mean air temperature is the average of the maximum and minimum temperatures of the whole month. The water temperatures are the mean temperatures for the whole month.

TABLE XVII.

Rainfall in Inches on Cochituate Water-shed, 1863 to 1895.

YEAR.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Totals.	4 months, July-Oct.
1863	4.10	4.38	3.57	11.34	2.66	1.98	14.12	5.61	3.39	4.56	8.54	5.05	69.30	27.68
1864	3.37	0.98	8.44	4.02	2.84	0.58	1.06	3.56	1.52	6.50	5.45	4.28	42.60	12.64
1865	4.99	4.45	5.48	2.18	8.25	0.91	3.10	3.36	1.66	6.99	4.78	3.31	49.46	15.11
1866	1.44	5.80	3.92	1.94	6.46	4.80	13.55	3.98	8.36	3.43	4.52	4.32	62.32	29.12
1867	2.76	5.40	5.65	2.43	6.46	2.95	5.36	12.36	1.08	7.27	2.63	1.90	56.25	26.07
1868	3.70	1.18	2.51	5.61	8.12	2.95	2.16	7.38	7.60	1.19	6.77	0.45	49.71	18.42
1869	3.71	7.07	7.52	2.57	7.59	3.63	2.63	2.34	8.49	9.50	3.26	5.98	64.34	22.96
1870	7.85	4.68	6.04	8.81	3.14	4.05	3.10	2.03	0.64	7.96	4.40	3.19	55.89	13.73
1871	1.31	2.30	5.02	2.20	5.66	5.96	2.20	3.56	1.46	5.38	7.01	3.34	45.39	12.60
1872	1.86	1.37	3.06	1.74	3.24	4.27	5.55	9.76	6.29	3.69	4.22	3.42	48.47	25.29
1873	4.24	2.43	3.98	2.69	3.24	0.38	4.08	7.17	2.62	6.11	4.54	3.95	45.43	19.98
1874	2.96	2.90	1.19	6.36	3.40	4.79	3.16	4.83	1.55	1.04	2.05	1.70	35.93	10.58
1875	2.42	3.15	3.74	3.23	3.56	6.24	3.57	5.53	3.43	4.85	4.83	0.94	45.49	17.38
1876	1.83	4.21	7.43	3.24	2.80	1.60	9.49	2.19	3.98	2.00	6.59	3.13	48.49	17.66
1877	3.19	0.53	7.79	3.24	3.73	2.64	2.77	3.35	0.46	8.14	6.94	1.02	43.80	14.72
1878	5.77	5.93	4.20	5.63	0.83	3.33	3.47	6.94	1.12	5.15	6.09	5.12	53.58	16.98
1879	2.00	3.05	3.90	4.69	1.30	4.14	3.38	6.43	1.74	0.90	2.98	3.60	38.01	12.45
1880	3.07	4.05	2.83	2.94	1.98	1.25	7.00	3.81	1.69	2.95	1.70	2.56	35.83	15.45

1881	5.56	4.43	4.79	1.71	3.18	4.83	2.78	1.13	2.13	2.87	3.85	3.83	41.09	8.91
1882	5.93	3.96	2.76	1.89	4.73	1.87	3.49	1.14	9.20	2.22	0.93	2.17	40.29	16.05
1883	2.88	3.59	1.76	2.27	3.95	1.81	2.88	0.39	1.31	5.16	2.06	3.14	31.20	9.74
1884	4.39	6.04	4.50	3.80	2.92	3.88	4.42	4.49	0.90	2.59	2.33	5.31	45.57	12.40
1885	5.25	3.98	1.99	3.71	3.46	2.96	1.73	7.01	1.63	5.26	5.26	2.32	43.66	15.63
1886	6.53	6.86	3.46	2.00	2.97	1.21	3.30	3.75	3.20	3.16	4.76	5.77	46.97	13.41
1887	5.29	5.34	5.10	4.45	1.02	2.58	3.77	3.70	1.28	2.49	2.76	3.80	41.58	11.24
1888	4.13	3.55	5.60	2.51	4.63	2.07	1.67	6.32	8.81	4.95	7.03	5.66	56.93	21.75
1889	5.46	1.56	2.28	3.19	3.64	3.17	9.10	4.57	4.92	3.85	5.79	2.70	50.23	22.44
1890	2.34	3.21	7.35	2.51	5.31	1.78	2.31	3.34	6.47	10.11	1.24	5.26	51.23	22.23
1891	6.67	5.02	5.49	3.62	1.67	3.78	2.99	4.91	2.12	4.14	2.84	3.17	46.42	14.16
1892	4.78	2.80	4.12	0.78	5.46	3.23	3.47	3.79	2.87	1.42	5.14	1.18	39.04	11.55
1893	2.61	7.26	3.13	3.21	5.45	2.75	2.40	5.86	1.76	3.74	2.08	5.03	45.28	13.76
1894	3.95	3.89	1.16	3.27	3.70	1.61	3.61	2.57	2.27	5.14	3.53	4.38	39.08	13.59
1895	3.93	1.70	3.11	5.03	2.03	3.12	4.71	3.96	2.77	9.57	6.32	2.71	48.96	21.01
Totals	130.27	127.05	141.97	113.90	129.38	97.15	142.18	151.12	108.81	154.28	143.22	113.59	1,557.82	556.39
Averages . . .	3.95	3.85	4.30	3.60	3.92	2.94	4.31	4.58	3.30	4.67	4.34	3.44	47.21	16.86

TABLE XVIII.
Rainfall collected, in Inches, on Cochituate Water-shed, 1863 to 1895.

YEAR.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Totals.	4 months, July-Oct.
1863	1.93	3.11	3.71	4.42	1.44	0.67	2.97	1.51	0.98	1.32	2.65	2.17	25.88	6.78
1864	2.39	1.56	4.05	2.65	1.62	0.49	0.41	0.68	0.49	1.43	1.25	1.33	18.35	3.01
1865	2.15	1.74	4.66	2.70	4.70	0.34	0.46	0.47	0.45	0.70	1.00	1.13	20.50	2.08
1866	0.73	2.84	1.76	1.63	1.29	1.10	1.20	0.64	1.34	0.93	0.99	1.56	16.01	4.11
1867	1.10	5.24	3.50	2.87	2.20	0.65	0.59	2.10	0.31	1.02	1.10	1.12	21.80	4.02
1868	1.22	1.12	3.84	3.48	6.17	1.59	0.45	1.18	1.85	0.95	1.96	1.17	24.98	4.43
1869	1.82	1.84	3.31	2.49	2.20	1.07	0.74	0.58	1.10	2.37	1.30	3.17	21.99	4.79
1870	4.71	3.93	3.33	6.87	1.66	0.97	0.53	0.41	0.86	1.11	0.88	0.77	26.08	2.91
1871	1.03	2.28	2.53	1.58	2.00	0.87	0.43	0.85	0.39	0.69	1.30	1.21	15.16	2.36
1872	1.15	0.93	1.41	3.08	1.10	1.49	0.14	1.32	1.70	1.69	2.00	1.21	17.22	4.85
1873	3.09	1.57	3.89	6.09	2.66	0.45	0.62	1.40	0.78	2.04	1.86	2.68	27.13	4.84
1874	3.55	2.19	1.84	3.19	2.78	1.96	0.95	0.92	0.53	0.92	0.58	0.51	19.52	2.92
1875	0.13	2.92	2.66	3.15	1.39	1.48	0.25	0.62	0.60	1.19	1.96	1.22	17.57	2.66
1876	1.09	1.73	5.19	4.20	1.43	0.51	0.84	0.29	0.88	0.49	1.85	0.99	19.54	2.50
1877	1.20	1.37	6.81	3.24	2.04	0.92	0.65	0.67	0.46	1.16	2.69	1.96	23.17	2.94
1878	3.25	3.97	5.40	2.86	1.66	0.76	0.47	0.84	0.29	0.73	2.07	4.04	26.34	2.33
1879	1.29	2.32	3.30	4.48	1.40	0.77	0.33	0.95	0.61	0.60	0.72	1.04	17.81	2.49
1880	1.47	2.24	1.79	1.57	0.44	0.66	0.33	0.23	0.24	0.49	0.83	0.61	10.30	1.29

1881	1.19	2.23	5.66	1.79	1.26	1.31	0.16	0.09	0.23	0.18	0.84	1.40	34	0.66
1882	1.84	3.00	3.67	0.93	1.55	0.62	0.06	0.07	0.97	0.84	0.58	0.92	16, 05	1.94
1883	0.84	1.59	2.04	1.66	1.26	0.07	0.02	0.07	0.62	0.59	0.41	0.94	15, 11	1.30
1884	1.84	2.86	4.67	4.00	1.89	0.67	0.26	0.61	0.13	0.34	0.62	1.82	10, 21	1.34
1885	1.90	2.00	2.21	2.36	1.61	0.43	0.00	0.33	0.25	0.79	2.05	1.64	19, 15.57	1.37
1886	2.28	7.93	3.51	2.52	1.09	0.18	0.25	0.14	0.30	0.42	1.20	2.10	21.92	1.11
1887	4.06	4.34	4.70	3.36	1.85	0.82	0.72	1.33	0.64	0.49	0.70	0.96	23.47	3.18
1888	1.13	2.77	4.76	3.45	2.37	0.53	0.47	0.94	2.31	2.57	4.21	5.46	30.97	6.29
1889	4.50	1.85	2.08	2.17	1.20	1.18	1.63	3.43	1.79	1.91	2.95	3.26	27.95	8.76
1890	1.92	2.04	5.87	2.23	1.85	1.41	0.33	0.46	1.40	3.40	1.49	2.11	24.51	5.59
1891	6.26	6.62	8.03	4.31	0.88	0.77	0.50	0.72	0.76	0.79	0.83	1.80	32.07	2.77
1892	3.18	1.64	3.12	0.90	2.03	0.49	0.33	0.56	0.60	0.57	1.09	0.84	15.35	2.06
1893	0.64	2.55	4.12	2.42	1.83	0.75	0.33	0.77	0.42	1.09	1.00	1.68	17.65	2.66
1894	1.27	1.60	2.55	2.15	0.91	0.45	0.38	0.41	0.46	0.66	0.92	1.14	12.99	1.91
1895	1.58	0.75	3.50	3.35	0.97	0.40	0.55	0.50	0.69	1.97	3.51	2.40	20.17	3.71
Totals	67.73	86.81	123.52	98.15	59.73	26.23	18.40	26.09	25.43	36.04	49.39	56.16	673.68	105.96
Averages	2.05	2.63	3.74	2.97	1.81	0.79	0.56	0.79	0.77	1.09	1.50	1.70	20.41	3.21

TABLE XIX.

Percentage of Rainfall collected on Cochituate Water-shed, 1863 to 1895.

YEAR.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Yearly.	4 months, July-Oct.
1863	47.0	71.0	104.0	39.0	54.0	34.0	21.0	27.0	29.0	29.0	31.0	43.0	38.8	24.5
1864	71.0	159.0	48.0	66.0	57.0	84.0	39.0	19.0	32.0	22.0	23.0	31.0	43.0	23.8
1865	43.0	39.0	85.0	124.0	57.0	37.0	15.0	14.0	27.0	10.0	21.0	34.0	41.4	13.8
1866	51.0	49.0	45.0	84.0	20.0	23.0	9.0	16.0	16.0	27.0	22.0	36.0	25.7	14.1
1867	40.0	97.0	62.0	113.0	34.0	22.0	11.0	17.0	29.0	14.0	42.0	59.0	38.7	15.4
1868	33.0	95.0	153.0	62.0	76.0	54.0	21.0	16.0	24.0	80.0	29.0	261.0	50.2	24.0
1869	49.0	26.0	44.0	97.0	29.0	29.0	28.0	25.0	13.0	25.0	40.0	53.0	34.2	20.9
1870	60.0	84.0	56.0	78.0	53.0	24.0	17.0	20.0	134.0	14.0	20.0	24.0	46.7	21.2
1871	79.0	99.0	50.4	68.8	35.3	14.6	19.6	23.8	26.8	12.8	18.5	37.4	33.4	18.7
1872	61.8	67.8	46.0	177.3	33.8	34.8	2.6	13.5	27.0	45.7	47.4	35.3	35.5	19.2
1873	72.9	64.8	97.8	226.4	82.2	119.1	15.1	19.5	29.8	33.4	40.9	67.9	59.8	24.2
1874	120.0	75.5	154.7	50.2	81.7	40.8	30.0	19.1	34.3	50.3	28.4	29.9	54.3	27.6
1875	5.5	92.8	71.2	97.5	39.9	23.7	7.1	11.2	17.4	24.6	40.5	129.8	38.6	15.3
1876	59.3	42.4	69.9	129.7	50.9	31.6	8.9	13.3	22.2	24.3	23.1	31.5	40.3	14.2
1877	37.6	293.9	87.4	100.0	54.6	34.8	23.3	19.6	99.8	14.3	38.8	192.6	52.9	20.0
1878	56.3	66.9	128.6	50.7	200.0	23.2	13.5	12.0	25.8	14.3	34.0	78.8	40.2	14.0
1879	64.4	76.3	84.5	95.6	117.0	18.6	9.7	14.7	35.0	66.5	24.2	28.9	46.9	20.0
1880	47.9	55.3	63.3	53.3	22.2	4.5	4.7	6.1	14.3	16.6	48.9	23.8	23.7	8.3

1881	21.5	50.3	118.1	104.8	39.6	27.0	5.8	7.6	10.8	6.4	21.8	36.7	39.8	7.4
1882	31.0	75.9	133.0	46.3	32.8	33.1	1.7	6.2	10.5	37.9	62.4	42.3	37.4	12.1
1883	29.2	44.3	115.8	73.1	31.9	3.7	0.6	18.6	47.4	11.5	20.0	29.8	32.4	13.3
1884	41.8	47.4	103.9	105.1	47.5	17.3	5.0	13.6	14.9	13.1	26.7	34.2	42.2	10.8
1885	36.1	50.2	202.7	63.6	46.7	14.4	0.0	4.8	15.5	15.0	39.0	70.7	35.7	8.8
1886	36.6	107.3	101.9	154.3	43.0	35.5	11.1	7.8	10.7	13.4	21.7	29.7	49.7	8.3
1887	60.2	80.8	72.0	81.3	112.0	47.3	13.2	27.1	32.0	18.7	23.4	25.6	47.8	28.3
1888	27.5	75.0	85.0	137.3	51.2	25.8	28.1	14.9	26.2	51.9	59.9	96.4	54.4	28.9
1889	82.5	118.7	91.5	68.1	32.9	37.1	17.9	75.0	38.4	49.6	50.9	120.9	55.6	39.0
1890	82.0	63.4	79.9	88.9	34.9	79.1	14.2	13.9	21.6	33.7	120.0	40.2	47.9	25.1
1891	93.8	131.9	146.3	119.1	52.8	20.4	16.7	14.7	35.9	19.0	29.2	50.5	69.1	19.6
1892	66.6	58.5	75.7	115.6	37.1	15.3	9.5	14.7	21.1	40.2	21.2	71.1	39.3	17.8
1893	24.5	35.1	131.7	75.7	33.5	27.2	15.9	13.2	23.9	28.8	43.4	33.4	39.0	19.3
1894	32.3	43.5	219.7	65.8	24.6	27.9	10.4	16.1	20.0	12.8	26.1	26.1	33.3	14.1
1895	40.1	44.2	112.4	66.5	47.8	13.0	11.8	12.6	25.0	20.6	55.5	88.6	41.2	17.7
Totals	1704.4	2549.2	3240.4	3085.9	1765.9	1076.8	458.3	567.6	988.3	896.4	1203.9	1993.1	1423.1	609.7
Averages . . .	51.65	77.25	98.19	93.51	53.51	32.63	13.89	17.20	29.94	27.16	36.48	60.39	43.12	18.48

T A B L E X X .
Rainfall, in Inches, on Sudbury-river Water-shed, 1875 to 1895.

YEAR.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Totals.	4 months, July-Oct.
1875	2.420	3.150	3.740	3.230	3.560	6.240	3.570	5.530	3.430	4.850	4.830	0.940	45.490	17.380
1876	1.830	4.210	7.430	4.197	2.763	2.040	9.134	1.720	4.614	2.241	5.764	3.620	49.563	17.709
1877	3.216	0.739	8.357	3.435	3.702	2.425	2.951	3.682	0.323	8.515	5.803	0.870	44.018	15.471
1878	5.632	5.973	4.689	5.790	0.956	3.384	2.971	6.937	1.291	6.417	7.024	6.367	57.931	17.616
1879	2.475	3.562	5.140	4.716	1.579	3.789	3.933	6.509	1.878	0.809	2.682	4.344	41.419	13.129
1880	3.566	3.080	3.315	3.105	1.836	2.138	6.273	4.008	1.603	3.740	1.785	2.828	33.177	15.624
1881	5.558	4.646	5.730	2.000	3.511	5.395	2.350	1.358	2.617	2.655	4.091	3.958	44.169	9.280
1882	5.951	4.546	2.649	1.824	5.066	1.664	1.769	1.667	8.741	2.074	1.147	2.296	39.394	14.251
1883	2.810	3.865	1.780	1.845	4.185	2.400	2.680	0.735	1.520	5.900	1.810	3.550	32.780	10.535
1884	5.085	6.545	4.720	4.405	3.470	3.445	3.665	4.650	0.855	2.480	2.645	5.170	47.135	11.650
1885	4.710	3.865	1.070	3.605	3.485	2.965	1.425	7.185	1.425	5.095	6.095	2.720	43.545	15.130
1886	6.365	6.280	3.610	2.224	2.995	1.465	3.265	4.100	2.905	3.235	4.645	4.975	46.065	13.505
1887	5.290	4.780	4.900	4.265	1.165	2.650	3.760	5.280	1.320	2.835	2.670	3.880	42.705	13.195
1888	4.150	3.685	6.020	2.425	4.825	2.535	1.405	6.225	8.585	4.990	7.224	5.395	57.465	21.205
1889	5.370	1.655	2.365	3.410	2.945	2.800	8.940	4.175	4.605	4.255	6.290	3.140	49.950	21.975
1890	2.530	3.505	7.735	2.645	5.210	2.030	2.460	3.865	6.000	10.510	1.200	5.310	53.000	22.855
1891	7.020	5.235	6.475	3.905	2.010	3.770	3.395	4.725	2.350	3.830	3.090	3.685	49.520	14.330
1892	5.850	3.140	4.060	0.830	5.585	2.760	4.230	4.440	2.840	1.170	5.800	1.125	41.830	12.680
1893	2.925	8.195	3.670	3.605	6.610	2.380	2.570	5.415	1.755	4.065	2.135	4.860	48.225	13.755
1894	4.090	3.910	1.435	3.415	4.235	1.155	3.255	2.030	2.635	5.345	3.425	4.810	39.740	13.265
1895	4.060	1.395	2.980	5.250	2.020	2.770	5.040	4.150	2.300	10.650	6.025	3.350	50.620	22.170
Totals	90.816	86.861	91.870	70.127	71.713	60.600	79.041	88.386	63.602	95.691	86.841	77.193	962.741	326.720
Averages . . .	4.325	4.136	4.375	3.339	3.415	2.886	3.764	4.209	3.029	4.557	4.135	3.676	45.845	15.558

TABLE XXI.
Rainfall collected, in Inches, on Sudbury-river Water-shed, 1875 to 1895.

YEAR.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Totals.	4 months, July-Oct.
1875	0.184	2.411	2.362	5.263	2.119	1.501	0.573	0.706	0.358	1.152	2.248	1.041	20.418	2.789
1876	1.147	2.282	7.911	5.683	2.031	0.383	0.326	0.723	0.318	0.417	1.878	0.809	23.908	1.784
1877	1.174	1.529	8.586	4.132	2.482	1.031	0.360	0.216	0.103	1.127	2.447	2.300	25.487	1.806
1878	3.228	3.972	6.256	2.807	2.487	0.873	0.229	0.848	0.277	0.921	2.922	5.667	30.487	2.275
1879	1.249	2.756	4.156	5.379	1.987	0.713	0.281	0.705	0.243	0.126	0.355	0.825	18.775	1.355
1880	2.000	2.982	2.451	2.017	0.917	0.303	0.315	0.212	0.138	0.181	0.354	0.312	12.182	0.846
1881	0.740	2.491	7.142	2.669	1.721	2.309	0.493	0.264	0.340	0.331	0.682	1.383	20.565	1.428
1882	2.213	3.872	5.064	1.497	2.304	0.913	0.154	0.099	0.529	0.534	0.362	0.561	18.102	1.316
1883	0.597	1.664	2.873	2.330	1.673	0.518	0.206	0.140	0.157	0.331	0.354	0.345	11.188	0.834
1884	1.775	4.742	6.752	4.925	1.838	0.719	0.399	0.458	0.076	0.148	0.302	1.650	23.784	1.081
1885	2.203	2.132	2.805	2.133	2.383	0.735	0.111	0.429	0.209	0.599	2.033	2.094	18.916	1.348
1886	2.606	7.734	3.672	3.361	1.285	0.350	0.206	0.168	0.203	0.260	1.161	1.819	22.825	0.837
1887	4.619	4.558	5.116	4.522	1.799	0.714	0.204	0.382	0.191	0.339	0.636	1.147	24.227	1.116
1888	1.878	3.255	5.775	4.566	2.612	0.728	0.209	0.677	1.994	3.566	4.761	5.428	35.749	6.446
1889	4.963	1.926	2.388	2.434	1.569	1.128	1.130	2.554	1.422	2.194	3.351	3.997	29.056	7.300
1890	2.237	2.463	6.498	3.236	2.437	0.980	0.191	0.235	0.790	4.053	2.097	1.776	26.983	5.259
1891	5.383	5.616	7.944	4.138	1.039	0.714	0.266	0.290	0.350	0.375	0.526	0.971	27.612	1.281
1892	3.335	1.574	3.488	1.504	2.245	0.739	0.382	0.500	0.396	0.224	1.204	0.865	16.456	1.502
1893	0.773	2.455	5.789	3.668	5.143	0.759	0.282	0.322	0.187	0.395	0.550	1.421	21.774	1.186
1894	1.236	1.596	3.992	2.832	1.498	0.723	0.287	0.373	0.258	0.668	1.442	1.277	16.182	1.586
1895	1.844	0.871	4.299	4.341	1.134	0.301	0.411	0.409	0.153	2.460	4.794	3.179	21.196	3.433
Totals	45.284	62.961	105.819	74.437	43.003	17.134	7.015	10.710	8.692	20.401	34.459	38.867	468.882	46.818
Average	2.161	2.998	5.039	3.545	2.048	0.816	0.334	0.510	0.414	0.971	1.641	1.851	22.328	2.229

TABLE XXII.

*Percentage of Rainfall collected on Sudbury-river Water-shed,
1875 to 1895.*

YEAR.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Yearly.	4 months, July-Oct.
1875 . . .	7.6	76.5	76.5	162.9	59.5	24.0	16.0	12.8	10.4	23.8	46.5	110.7	44.9	16.0
1876 . . .	62.7	54.2	106.5	135.4	73.5	18.8	3.6	42.0	6.9	18.6	32.6	22.3	48.2	10.1
1877 . . .	36.5	206.9	102.7	120.3	67.0	42.5	12.2	5.9	31.9	13.2	42.2	264.4	57.9	11.7
1878 . . .	57.3	66.5	133.4	48.5	260.2	22.5	7.7	12.2	21.5	14.3	41.6	89.0	52.6	12.9
1879 . . .	50.4	77.4	80.9	114.1	125.8	18.8	7.1	10.8	12.9	15.6	13.2	19.0	45.3	10.3
1880 . . .	56.0	74.9	73.9	65.0	50.0	14.2	5.0	5.3	8.6	4.8	19.9	11.0	31.9	5.4
1881 . . .	13.3	53.6	124.6	133.4	49.0	42.8	21.0	19.4	13.0	11.2	16.7	34.9	46.6	15.4
1882 . . .	37.2	85.2	191.2	82.1	45.5	54.9	8.7	5.9	6.0	25.7	31.5	24.5	45.9	9.2
1883 . . .	21.2	43.0	161.4	126.3	40.0	21.6	7.7	19.1	10.4	5.9	19.5	9.7	34.1	7.9
1884 . . .	34.9	72.5	143.1	111.8	53.0	20.9	10.9	9.8	8.9	6.0	11.4	31.9	50.5	9.3
1885 . . .	46.8	56.4	262.1	86.9	68.4	25.7	7.8	6.0	14.7	11.8	33.3	77.0	43.4	8.9
1886 . . .	40.9	123.2	101.7	151.1	42.9	23.9	6.3	4.1	7.0	8.0	25.0	36.6	49.5	6.2
1887 . . .	88.8	95.3	104.4	106.0	154.5	26.9	5.5	7.2	14.5	12.0	23.8	29.6	56.7	8.5
1888 . . .	45.3	88.3	95.9	188.3	60.3	28.7	14.9	10.9	23.2	71.4	65.9	100.6	62.2	30.4
1889 . . .	92.4	116.4	100.9	71.4	53.3	40.3	12.6	61.2	30.9	51.6	53.3	127.3	58.2	33.2
1890 . . .	88.4	70.3	84.0	122.3	46.8	48.3	7.8	6.1	13.2	38.6	174.7	33.5	50.9	23.1
1891 . . .	76.7	107.3	122.7	106.0	51.7	18.9	7.8	6.1	14.7	9.8	17.0	26.3	55.8	8.9
1892 . . .	57.0	50.1	85.9	181.1	40.2	26.8	9.0	11.3	13.9	19.2	20.7	76.9	39.3	11.8
1893 . . .	26.4	30.3	157.7	101.7	77.8	31.9	11.0	5.9	10.8	9.7	25.1	29.2	45.2	8.6
1894 . . .	30.2	40.8	278.2	82.9	35.4	62.6	8.8	18.4	9.8	12.5	42.1	26.5	40.7	12.0
1895 . . .	45.4	62.5	144.2	82.7	56.1	10.8	8.2	9.9	6.7	23.0	72.4	94.9	47.8	15.5
Totals .	1015.4	1651.6	2731.9	2380.2	1510.9	625.8	199.6	290.3	239.9	406.7	328.4	1275.8	1007.6	275.3
Averages,	48.4	78.6	130.1	113.3	71.9	29.8	9.5	13.8	13.8	19.4	39.4	60.8	48.0	13.1

TABLE XXIII.
Rainfall, in Inches, on Mystic Water-shed, 1878 to 1895.

YEAR.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Totals.	4 months, July-Oct.
1878	5.07	5.74	3.93	5.73	0.67	2.62	3.52	7.51	3.19	4.95	5.69	4.845	54.065	19.17
1879	1.82	2.73	3.52	4.65	1.86	3.98	2.39	5.48	1.60	0.77	2.76	3.74	35.30	10.24
1880	2.62	4.23	2.49	2.18	2.02	1.49	7.23	3.64	1.42	2.70	1.90	2.50	34.42	14.99
1881	5.82	3.63	6.09	1.54	2.98	6.84	2.60	0.67	2.17	2.16	3.52	3.29	41.91	7.60
1882	5.545	4.68	2.49	2.11	4.58	2.09	2.34	1.065	8.35	1.94	1.745	2.23	39.165	13.695
1883	2.07	3.065	2.22	2.47	3.585	1.635	2.785	0.87	1.495	5.45	1.98	2.995	31.22	10.60
1884	4.745	6.085	4.255	3.18	2.95	4.635	3.72	4.855	0.70	2.70	2.005	4.56	44.39	11.975
1885	4.83	3.40	1.175	3.445	3.945	4.41	2.04	5.90	1.425	5.52	6.31	2.10	44.50	14.885
1886	6.315	7.175	3.84	2.10	2.945	1.54	3.71	3.24	2.955	2.85	4.065	4.825	45.560	12.755
1887	5.245	4.47	5.00	4.605	1.69	2.695	6.585	4.965	1.50	3.04	3.05	3.575	46.42	16.090
1888	4.05	3.28	5.185	2.84	5.095	2.20	2.23	6.23	8.56	4.955	6.85	5.27	56.745	21.975
1889	5.505	1.86	2.285	3.61	4.64	3.315	8.455	3.92	4.705	3.59	5.65	2.86	50.395	20.67
1890	2.725	3.38	6.68	2.405	6.30	3.38	2.265	3.64	3.70	8.34	1.385	4.67	49.37	18.445
1891	6.245	5.075	6.07	3.15	2.46	4.43	3.18	3.88	2.16	4.735	2.605	3.41	47.40	13.955
1892	4.515	3.015	4.005	0.815	5.585	4.15	2.575	4.82	2.005	1.835	4.645	1.15	39.115	11.235
1893	2.26	7.50	2.55	3.37	6.26	2.10	2.04	5.41	2.01	4.10	2.25	4.35	44.20	13.56
1894	3.93	3.31	1.09	3.48	5.18	0.72	3.45	2.52	2.52	5.58	3.49	3.97	39.24	14.07
1895	3.535	0.655	3.00	4.185	3.150	3.630	4.345	5.435	2.040	10.195	6.260	2.300	48.73	22.015
Totals	73.045	73.230	66.475	55.865	65.895	55.860	65.460	74.050	52.505	75.910	66.160	62.640	792.145	267.925
Averages	4.336	4.071	3.693	3.104	3.661	3.103	3.637	4.114	2.917	4.217	3.676	3.480	44.008	14.885

TABLE XXIV.

Rainfall collected, in Inches, on Mystic Water-shed, 1878 to 1895.

YEAR.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Totals.	4 months, July-Oct.
1878	3.55	3.97	4.91	2.21	2.16	0.78	0.48	1.11	0.56	0.71	1.75	3.63	25.82	2.86
1879	1.21	2.33	3.31	3.97	1.95	0.97	0.54	0.70	0.48	0.34	0.45	0.69	16.94	2.06
1880	1.70	2.54	1.95	1.50	0.96	0.51	0.67	0.54	0.45	0.36	0.44	0.59	12.21	2.02
1881	0.82	2.14	6.79	2.17	1.51	2.05	0.87	0.35	0.31	0.29	0.50	0.87	18.67	1.82
1882	1.37	3.03	4.19	1.16	1.85	0.81	0.35	0.22	0.53	0.58	0.39	0.57	15.05	1.68
1883	0.70	1.43	1.88	1.63	1.20	0.52	0.30	0.22	0.18	0.39	0.42	0.44	9.31	1.09
1884	1.49	3.89	5.42	3.85	1.48	0.85	0.58	0.60	0.23	0.27	0.35	1.17	20.18	1.68
1885	1.79	1.81	2.05	2.03	2.18	0.86	0.47	0.54	0.34	0.68	2.41	2.39	17.55	2.03
1886	2.21	7.70	3.91	3.24	1.27	0.55	0.41	0.25	0.32	0.38	0.88	1.43	22.65	1.36
1887	3.16	3.61	3.60	3.75	1.89	1.27	0.87	1.35	0.48	0.57	0.71	0.91	22.17	3.27
1888	1.43	3.32	4.28	3.27	2.88	0.84	0.39	0.54	1.31	2.74	5.04	5.08	31.12	4.98
1889	4.51	1.33	1.60	2.27	2.18	1.89	1.33	2.05	1.06	1.21	2.49	3.06	25.48	5.65
1890	2.07	2.23	5.37	2.93	3.00	1.92	0.43	0.46	0.58	2.61	1.95	2.49	26.04	4.08
1891	6.29	5.97	7.21	3.43	1.40	1.01	0.42	0.44	0.42	0.58	0.56	0.87	28.60	1.86
1892	2.49	1.76	3.03	1.33	2.10	1.17	0.66	0.49	0.56	0.45	1.07	0.87	15.98	2.16
1893	0.75	2.14	4.52	2.72	4.42	1.04	0.47	0.69	0.41	0.55	0.71	1.27	19.69	2.12
1894	1.37	1.87	3.05	2.27	1.31	0.91	0.49	0.38	0.36	0.58	0.91	0.90	14.40	1.81
1895	1.50	0.81	3.12	2.70	1.31	0.50	0.55	0.77	0.32	1.43	2.34	2.08	17.43	3.07
Totals	38.51	52.38	70.19	46.43	35.05	18.45	10.28	11.70	8.90	14.72	23.37	29.31	359.29	45.60
Averages . .	2.14	2.91	3.90	2.58	1.95	1.03	0.57	0.65	0.49	0.82	1.30	1.63	19.96	2.53

TABLE XXV.

Percentage of Waterfall collected at Mystic Water-shed, 1878 to 1895.

YEAR.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Yearly.	4 months, July-Oct.
1878	62.6	69.2	125.0	38.6	322.9	29.6	13.5	14.8	17.7	14.3	30.8	74.9	47.8	14.9
1879	66.6	85.4	93.9	85.3	104.9	24.5	22.6	12.8	29.7	44.2	16.2	18.6	48.0	20.1
1880	64.9	60.1	78.4	68.8	47.3	34.3	9.2	14.7	31.7	13.5	22.9	23.8	35.5	13.5
1881	14.2	58.9	101.5	141.1	50.7	29.9	33.3	51.9	14.1	13.6	14.3	26.3	44.5	23.9
1882	24.8	64.8	168.4	55.0	40.4	38.6	14.9	20.8	6.3	30.0	22.2	25.5	38.4	12.3
1883	26.1	46.7	84.8	65.9	33.5	31.8	10.8	25.7	12.1	7.2	21.1	14.7	29.8	10.3
1884	31.5	63.9	127.3	121.2	50.2	18.3	15.5	12.4	33.5	9.9	17.4	25.6	45.5	14.0
1885	37.1	53.3	174.5	58.8	55.3	19.6	22.8	9.2	23.7	12.2	38.2	113.6	39.4	13.6
1886	36.6	107.3	101.9	154.3	43.0	35.5	11.1	7.8	10.7	13.4	21.7	29.7	49.7	10.7
1887	60.2	80.8	72.0	81.3	112.0	47.3	13.2	27.1	32.0	18.7	23.4	25.6	47.8	20.3
1888	35.2	101.3	82.5	115.2	56.6	38.1	17.5	8.8	15.3	55.3	73.6	96.4	54.8	22.7
1889	81.8	98.2	70.2	63.0	46.9	57.0	15.8	52.2	22.5	33.7	44.1	107.0	50.6	27.3
1890	75.6	66.0	80.4	121.8	47.6	56.9	19.0	12.7	15.6	29.5	141.2	53.5	52.8	22.1
1891	100.7	117.8	118.7	109.0	57.0	22.8	13.3	11.3	19.3	12.1	21.7	25.6	60.3	13.3
1892	55.0	58.5	75.7	163.6	37.5	28.3	25.7	10.2	27.7	24.3	23.1	75.2	40.9	19.2
1893	33.3	28.6	177.3	80.7	70.6	49.5	23.2	12.6	20.5	13.4	31.5	29.1	44.5	15.6
1894	34.8	56.5	280.1	65.4	25.3	125.8	14.2	15.1	14.3	10.5	26.0	22.7	36.7	12.9
1895	42.4	123.4	103.9	64.7	41.5	13.7	12.8	14.1	15.7	14.0	37.3	90.7	35.8	13.9
Totals . .	883.4	1340.5	2116.5	1653.7	1243.2	701.5	508.4	334.2	362.4	369.8	626.7	878.5	802.8	300.6
Averages .	49.1	74.5	117.6	91.9	69.1	39.0	17.1	18.6	20.1	20.5	34.8	48.8	44.6	16.7

TABLE XXVI.

Yield of Sudbury-river Water-shed, 1875-1895. Area of water-shed used, includes water surfaces.

Year.	Rain-fall.	Daily Average Yield for Year.	Yield per Square Mile per Day.	Rain-fall, July-Oct.	Daily Average Yield, July-Oct.	Yield per Square Mile per Day.	Minimum Monthly Yield.				Minimum Yield in any Week.		
								Month.	Inches.	Daily Average Yield for Month.	Yield per Square Mile per Day.	Daily Average Yield for Week.	Gallons.
	Inches.	Gallons.	Gallons.	Inches.	Gallons.	Gallons.						Week.	Gallons.
1875	45.490	75,599,200	972,200	17.380	30,650,400	394,100		January . . .	2.420	8,000,000	102,900		
1876	49.563	88,278,400	1,135,200	17.709	19,603,300	252,100		July	9.134	14,229,000	183,000		51,400
1877	44.018	94,369,200	1,213,500	15.471	19,832,100	255,000		September . .	0.323	4,633,300	59,600		23,100
1878	57.931	112,882,200	1,451,600	17.616	25,001,600	321,500		July	2.971	9,983,900	128,400		68,200
1879	41.419	69,942,200	894,000	13.129	14,974,000	191,400		October . . .	0.809	5,532,300	70,700		
1880	38.177	45,250,300	578,400	15.624	9,356,100	119,000		September . .	1.603	6,280,000	80,300		
1881	44.169	73,683,900	979,200	9.280	15,178,900	201,800		August	1.358	11,135,500	148,100		
1882	39.394	64,812,300	861,900	14.251	13,977,200	185,900		August	1.667	4,158,100	55,300	Aug. 20-28	34,600
1883	32.780	40,056,200	532,700	10.535	8,870,700	118,000		August	0.735	5,906,500	78,500		
1884	47.135	84,929,200	1,129,400	11.650	11,487,000	152,800		September . .	0.855	3,303,300	43,900	Sept. 14-20	700
1885	43.545	67,721,600	900,600	15.130	14,313,000	190,300		July	1.425	4,667,700	62,100 ²		
1886	46.065	81,730,700	1,086,800	13.505	8,891,900	118,200		August	4.100	7,077,400	94,100		
1887	42.705	86,749,300	1,153,600	13.195	11,874,800	157,900		September . .	1.320	8,346,700	111,000	Sept. 18-24	82,000
1888	57.465	127,642,900	1,667,400	21.205	68,478,000	910,600		July	1.405	8,825,800	117,400		

1889	49,350	104,030,100	1,333,400	21,975	77,562,400	1,031,400	July	8,940	47,645,200	653,600	July 13-19	3,446,800	45,800
1890	53,000	96,650,400	1,285,200	22,835	55,975,600	744,400	July	2,460	8,064,500	107,200			
1891	49,520	98,865,500	1,314,700	14,330	12,608,900	181,000	July	3,395	11,212,900	149,100			
1892	41,830	58,753,000	781,300	12,680	15,957,700	212,200	October . . .	1,170	9,461,300	125,800			
1893	48,225	77,963,300	1,036,700	13,785	12,602,400	167,600	September . .	1,735	8,126,700	108,100			
1894	39,740	57,937,800	770,400	13,265	16,856,900	224,200	September . .	2,635	11,243,300	149,500			
1895	50,620	86,632,900	1,152,000	22,170	36,477,200	485,100	September . .	2,300	6,673,300	88,700			
Averages! .	45.845	80,657,200	1,073,000	15.559	23,882,400	317,600							

SUMMARY OF STATISTICS.

REPORT FOR 1895.

Boston Water Works, Suffolk County, Massachusetts, supplies also the cities of Somerville, Chelsea, and Everett.

Population by census of 1895 :

Boston	496,920
Chelsea	31,264
Somerville	52,200
Everett	18,573
Total	598,957

Date of construction :

Cochituate Works	1848
Mystic	1864

By whom owned. — City of Boston.

Sources of supply. — Lake Cochituate, Sudbury river, and Mystic lake.

Mode of supply. — Sixty-five per cent. from gravity works.

Thirty-five “ “ pumping “

PUMPING.

	COCHITUATE.	MYSTIC.
Builder of pumping machinery	Holly Mfg. Co. and Quintard Iron Works.	H. R. Worthington and G. F. Blake Mfg. Co.
Description of coal used :		
a Kind	Bituminous.	Bituminous.
c Size	Broken.	Broken.
e Price per gross ton, in bins	\$4.27, \$3.92½, \$3.90.	\$3.63, \$3.59, \$3.34.
f Per cent. of ash,	10.2	10.9
	COCHITUATE.	MYSTIC.
Coal consumed for year, in lbs. .	4,866,806	8,121,000
Total pumpage for year, in gallons	4,165,789,530	3,455,822,700
Gallons pumped per lb. of coal .	855.9	425.5
Cost of pumping figured on pumping-station expenses, viz. :	\$31,566.85	\$30,569.07
Cost per million gallons raised to reservoir	\$7.58	\$8.84

CONSUMPTION.

	COCHITUATE.	MYSTIC.
Estimated population . . .	487,000	113,700
Estimated number of consumers, . . .	483,500	112,500
Total consumption, gallons . . .	18,542,416,600	3,455,460,300
Passed through meters . . .	4,410,825,000	768,600,000
Percentage metered . . .	23.8	22.2
Average daily consumption, gal- lons . . .	50,801,100	9,467,000
Gallons per day, each inhabi- tant . . .	104.3	83.3
Gallons per day, each consumer, . . .	105.0	84.1
Gallons per day to each tap . . .	716.7	392.5

DISTRIBUTION.

Mains.

	COCHITUATE.	MYSTIC.
Kind of pipe used . . . {	Cast-Iron.	Cast-Iron, Wrought- Iron, and Cement.
Sizes	48 in. to 4 in.	30 in. to 3 in.
Extended, miles . . .	23.1	4.9
Total now in use . . .	595.9	178.6
Distribution-pipes less than 4 in., length, miles . . .	2.2	4.3
Hydrants added . . .	242	97
Hydrants now in use . . .	6,459	1,543
Stop-gates added . . .	289	147
Stop-gates now in use . . .	6,648	2,285

Services.

Kind of pipe used . . . {	Lead.	Lead and Wrought-Iron.
Sizes	$\frac{5}{8}$ in. to 6 in.	$\frac{1}{2}$ in. to 4 in.
Extended, feet . . .	53,192	20,524
Service-taps added . . .	2,323	863
Total now in use . . .	70,879	24,120
Meters added . . .	61	10
Meters now in use . . .	4,398	504
Motors and elevators in use . . .	512	21

¹ BOSTON WATER BOARD.*Organized July 31, 1876.*

TIMOTHY T. SAWYER, from July 31, 1876, to May 5, 1879; and from May 1, 1882, to May 4, 1883.

LEONARD R. CUTTER, from July 31, 1876, to May 4, 1883.²

ALBERT STANWOOD, from July 31, 1876, to May 7, 1883.

FRANCIS THOMPSON, from May 5, 1879, to May 1, 1882.²

WILLIAM A. SIMMONS, from May 7, 1883, to August 18, 1885.

GEORGE M. HOBBS, from May 4, 1883, to May 4, 1885.

JOHN G. BLAKE, from May 4, 1883, to August 18, 1885.

WILLIAM B. SMART, from May 4, 1885, to March 18, 1889.

HORACE T. ROCKWELL, from August 25, 1885, to April 25, 1888.

PHILIP J. DOHERTY, from March 18, 1889, to May 4, 1891.

THOMAS F. DOHERTY, from August 26, 1885, to May 5, 1890; and from May 4, 1891, to July 1, 1895.

ROBERT GRANT, from April 25, 1888, to July 18, 1893.

JOHN W. LEIGHTON, from May 5, 1890, to July 1, 1895.

WILLIAM S. McNARY, from August 15, 1893, to November 5, 1894.

CHARLES W. SMITH, from January 23, 1895, to July 1, 1895.

ORGANIZATION OF THE BOARD TO JULY 1, 1895.

Chairman.

THOS. F. DOHERTY.

Chief Clerk and Secretary.

WALTER E. SWAN.

FROM JULY 1, 1895.

¹ *Water Commissioner.*

CHARLES W. SMITH.

Assistant Water Commissioner.

JEREMIAH J. MCCARTHY.

Chief Clerk and Secretary.

WALTER E. SWAN.

General Superintendent Income Division.

JOS. H. CALDWELL.

City Engineer and Engineer of the Department.

WILLIAM JACKSON.

¹ Under Chap. 449 of the Acts of 1895 the Boston Water Board was abolished, and the Water-Supply and Water-Income Departments consolidated and placed under the charge of one Water Commissioner.

² Deceased.

*General Superintendent of the Western Division and Resident Engineer
of Additional Supply.*

DESMOND FITZGERALD.

General Superintendent of the Eastern Division of Cochituate Department.

WILLIAM J. WELCH, to July 1.

HENRY C. RICHARDSON, from July 1.

General Superintendent of the Mystic Division.

EUGENE S. SULLIVAN.

General Superintendent of Pumping-Stations.

M. H. BALLOU, from July 1, 1895.

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